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No. 1. JULY, 1895. Vol. VI.

ADDRESS TO THE ROYAL GEOGRAPHICAL SOCIETY.*

By CLEMENTS R. MARKHAM, C.B., F.R.S., President.

During the last year there has been exceptional activity among geographers, both in the field and in the study. In the Arctic Regions our gold medallist, Fridtjof Nansen, is still, we hope and believe, pushing his daring expedition onward into the unknown. Mr. Jackson and his companions have wintered on the shores of Franz Joseph Land, and are about to commence their exploring work. Lieut. Peary is still engaged on his Greenland enterprise; and Baron Toll has made known the exceedingly valuable results of his visit to the New Siberia islands. As regards Asia, Mr. and Mrs. Bent have just returned from their interesting journey into the interior of Arabia. Dr. Sven Hedin and Mr. Littledale are still engaged in the difficult task of exploring the unknown parts of Tibet; while our Vice-President and gold medallist, Mr. George Curzon, has explored the Pamirs, determined the true source of the Oxus, and made a very remarkable journey through Afghanistan. Among our African travellers Mr. Weld Blundell has returned from Cyrenaica, Dr. Hinde from his exploration of the Lukuga outlet of Lake Tanganyika, Mr. Scott Elliot from his very important examination of the Ruwenzori region, and Dr. Donaldson Smith is still persevering in his attempt to reach the country north of lake Rudolf, from Somaliland. As regards North America, exploration through the interior of the Labrador Peninsula has been conducted by Mr. A. P. Low, and an expedition has been successfully led through the barren lands of Northern Canada by Mr. J. Burr Tyrrell, of both of which undertakings full accounts have been or will be published in our *Journal*. Sir William Macgregor, who has already done such excellent geographical work in New Guinea during a long course of years, has again returned to his

* Delivered at the Anniversary Meeting, May 27, 1895.

government, with a supply of instruments provided by the Society, and with the intention of increasing our obligations to him, as geographers. But he already deserves the highest honour this Society can confer upon him. The chief literary event of the year is Dr. John Murray's completion of the great work on the results of the *Challenger* Expedition, to which I propose to refer more fully in another part of my address; and next in importance is the work on the Morphology of the Earth's Surface by Dr. Penck. We have had a popular work from Dr. Robert Brown, giving us the story of Africa and its explorers in full detail; Sir W. Martin Conway's account of his successful and very interesting Karakorum expedition, Mr. Curzon's Problems of the Far East, and three important works on Tibet by our gold medallists, Mr. Rockhill and Captain Bower, and by Dr. Waddell. I may also mention the new edition of Mr. Keltie's very useful work on the Partition of Africa. Our grants in aid of geographical and archæological exploring in Asia Minor, have been fully justified by the results of the work executed by Mr. Hogarth's expedition in the upper valley of the Euphrates, and by that of Mr. Paton and Mr. Myres in Caria.

The intention I announced, in my address last year, of attaching a list of Fellows who have written for our publications, or have published books on subjects connected with our science, or have been distinguished as explorers, to the general List of Fellows, has now been carried out. It is arranged in two parts, the first alphabetical, and the second according to countries and subjects. I trust that it will be found useful, and that, by informing the great body of the Fellows respecting the qualifications of such of their associates as possess special knowledge, it will have a tendency to give rise to more intimate relations among themselves and with the Council. I shall be glad to receive any suggestions respecting this list from the Fellows, and any proposed additions to it.

A decision was arrived at with reference to our premises last summer, it being resolved that the accommodation in our present house should be improved and enlarged, and that it should be fitted throughout with the electric light. The work was commenced in July, 1894; and several hundred Fellows, at my reception last December, were enabled to inspect the alterations from roof to cellar in, I trust, an agreeable way, and to judge of the increased comfort that had been provided for students, and of the improved arrangements for our large collection of maps, books, photographs, and instruments. The alterations have made it possible to re-arrange the shelves of the library and to re-classify the volumes, which has involved very heavy work. Great progress has also been made in the press-marking, and a geographical arrangement of the library has been adopted, while the immense stock of bound volumes of transactions of Societies have been put into thoroughly good order by Dr. Murie. The upper library is supplied with tables for Fellows who

are engaged in geographical investigations. The increased attractions of our rooms have produced the anticipated result of increasing the number of Fellows who use the library, and the borrowing of books has also increased. The alphabetical author's catalogue, as I promised at the last anniversary, is now finished, with its three appendices, and will be in the hands of Fellows as soon as the volumes are bound. Dr. Murie deserves great credit for his share of this work, especially for his classification of the periodicals, and important assistance has been rendered by Mr. Heawood in preparing the second appendix. Two of the Members of our Council have been so good as to read over the whole of the proofs of the alphabetical part of the catalogue, making numerous corrections, and Dr. Mill has personally verified all the cross-references, and has superintended the whole work with untiring zeal and ability. The alphabetical part of the catalogue contains 15,000 titles and 5000 cross-references, and the appendices have nearly an equal number of entries.

Work on the subject-catalogue will now be carried on without intermission. A large part of it is done; and, in order to make it available with as little delay as possible, I am inclined to advise that the divisions shall be completed one by one, instead of proceeding on all departments simultaneously, and that they shall be brought out as they are completed.

The compilation of the catalogues has revealed many serious gaps in the library, and I have supplied some lists of works which ought to be added. These are classified in a new desiderata book, and the works will be secured as opportunities offer. Our library is excellent, and, as regards early geographical work, I believe that it is even approaching completion. But we must strive to make it perfect; and I would invite the Fellows to assist us in filling up the desiderata book with the names of geographical works which we do not now possess. It would also be desirable if every Fellow would supply a separate copy of any papers on geographical subjects which he may have written, but which are not in the library.

The afternoon meetings in the Society's map room were commenced this session. It appeared to me that the more special and scientific sides of our work were not receiving sufficient attention, and those who are interested in them have not been afforded proper opportunities for bringing forward or discussing important points unless they were rendered popular, and adapted for a mixed audience. There are many questions of interest relating to geographical science which cannot be so treated, and which require an audience more or less of experts for their due hearing and discussion. This want has now been provided for, and the more strictly scientific phases of geography are no longer ignored. The communications which I anticipated for reading at the afternoon meetings relate to special points in comparative geography,

to cartography in all its branches, to orthography, to the invention and improvement of instruments and other appliances, to special points in oceanography, to questions in physics bearing on geography, and to kindred subjects. I thought that all these might most usefully be received and discussed by select audiences of experts among our Fellows.

We have had four of these afternoon meetings during the present session. At the first a paper was read by Mr. Yule Oldham, on his theory of an early discovery of America, deduced from a marginal note on the 1447 map of Andrea Bianco. It was followed by a very full discussion, for which there certainly would not have been time at one of our ordinary evening meetings. In January we were favoured with a most valuable lecture from Professor Rücker on terrestrial magnetism, which was followed by a discussion, in which several scientific men of great eminence took part. We had a third very interesting afternoon meeting on February 22. On this occasion my talented young friend Lieut. Carlyon Bellairs, R.N., explained to us his graphic method of showing the duration of daylight, which is equally useful to the traveller and for operations of war. Mr. W. B. Blaikie showed us his new cosmosphere, and Mr. R. A. Gregory exhibited his instrument for demonstrating the apparent diurnal motions of celestial bodies. In March Dr. J. W. Gregory, the accomplished geologist and well-known African traveller, discussed the palæontological evidence as to the age of the Atlantic. His address was followed by a very instructive discussion, in which both geographical and geological considerations were brought to bear on the question.

The want of some such provision for the consideration and discussion of scientific and technical points had long been felt. It will be remembered that, during three sessions—from 1876 to 1879—three scientific lectures were delivered in each session, but, after 1879, they were discontinued, and nothing was done to supply their place. The arrangement by which the communication of scientific and technical papers is invited, and their consideration and discussion provided for at afternoon meetings, will, I hope, fully meet the want which has so long been felt in the Society. I believe that our afternoon meetings will be the means of drawing to us the sympathy of scientific men, and that they will lead to the discussion of important and interesting technical questions in various departments of our science which have not hitherto received due attention.

The meeting of the International Geographical Congress in July warns us to look to our own position as geographers, and to consider whether we are quite abreast of our foreign friends in the various departments of our science. In geographical education we must sorrowfully confess that we are still far behind, in spite of all the efforts and all the expenditure of this Society during a long term of years. But the time is approaching for a reconsideration of the educational policy of

the Society, and I trust that we shall pass from the experimental stage to the development of a defined and carefully considered system producing valuable results to our countrymen.

My own fixed opinion has always been that our Society is the only institution in this country which has the means or the will to establish the teaching of geography on such a footing as will place it in line with the position it now holds in other countries. I have urged this view for upwards of a quarter of a century. I have advised that instruction should be given by us, and that diplomas should be granted to young geographers. After more than ten years I prevailed upon the Council to sanction the system of instruction by Mr. Coles, which has now been at work for seventeen years, and which is the most successful and useful educational measure that has yet been adopted by us. But I always intended that this system should be enlarged and extended until geographical education, under the control of this Society, was on an equality with the position it holds abroad. Other educational experiments, adopted by the Council, have interrupted the further development of the preliminary step inaugurated in 1879; but I am in hopes that the time has now arrived for the consideration of a scheme of geographical education under the immediate auspices of the Society. Such a scheme should embrace personal instruction in all the branches of our science, attendance at lectures, examinations, and the granting of certificates and diplomas. We alone have the needful apparatus for conducting such a course of instruction; we alone have the library, and the collection of maps and instruments, and the knowledge of what is required, and in no way can our splendid collections be put to better use. Mr. J. Scott Keltie, in 1884, made a survey of the higher geographical education in other countries, and submitted a very able and comprehensive report. I think the time has come for making another survey on the same lines, to include Russia and the United States; and with full information before our Council, a comprehensive scheme for higher geographical education, under the auspices and the control of the Society, would be matured. There are reasons to hope that our own efforts will, before long, be made to fit in with other educational movements which are taking a similar direction, and which will co-operate to secure the same end. At this moment various causes are at work which, I hope and believe, will combine to produce the establishment of a system of geographical education on correct principles, in close co-operation with the Royal Geographical Society, and which will have a most beneficial effect on all classes of our countrymen. If my anticipations are fulfilled, this country will, in the near future, no longer lag behind, but will take her proper position in line with our friends abroad, as regards the educational department of our work.

At Oxford there is the testimony of several high University authorities that the geographical readership has been very useful to

students for modern history honours. We may, therefore, confidently expect that the two great Universities will, after the termination of the present arrangement with the Society, make adequate provision out of their own funds for these geographical readerships. Mr. Mackinder at Oxford has done admirable work, and there can be no doubt that his lectures have been useful in many ways. Mr. Yule Oldham, at Cambridge, during a shorter time, has laboured zealously and with some success in the cause of geography; and Mr. Herbertson, the Lecturer at Manchester, to whose salary the Society also contributes, is, I understand, doing very good work. During the present year he has, in addition to his systematic lectures at Owens College, given a course of geographical lectures at Edinburgh. The prizes given to the Training Colleges and for the Oxford and Cambridge Local Examinations have been very successful measures, and the results of the Society's prizes to the *Worcester* and *Conway* have also been highly satisfactory. Mr. Mackinder's lectures on the history of geography and geographical discovery at Gresham College during the present year were well attended. I acted as examiner on the first series of lectures, and found that the candidates had acquired a fair knowledge of the subject which had been chosen for their special study. Dr. Mill, our librarian, has also given courses of lectures on geography at Brighton, Southampton, and Ramsgate, and special lectures to the Geographical Societies at Edinburgh and Liverpool during the year.

It is a hopeful indication of the interest that has been aroused in the teaching of geography, that some of the assistant masters in public schools, headed by Mr. Dickinson, of Rugby, have formed an Association with the object of improving geographical education in schools. The efforts of the Association are directed to supplying adequate means of illustrating lessons by maps and photographs, to assisting teachers to acquire facility in using such illustrations, and to induce examining bodies to set papers which would be more in accordance with modern views of geographical teaching than those now usually prepared. These laudable efforts deserve recognition and encouragement, and may lead to valuable results with regard to the civil service and army examinations, and to the local examinations of the universities. If the standard of examinations was fixed, after consultation with experienced geographical instructors who are familiar with the Continental and American, as well as with British methods, improvements in teaching would necessarily follow.

The subject of geographical education will occupy the attention of the International Congress, and we may look forward to deriving much information from the experienced and learned men who will address us on this branch of our subject; and to receiving a stimulus calculated to bear good fruit in the adoption of measures to bring us in line with those countries which are, at the present moment, far in advance of us.

I am also reminded by the heavy losses we have sustained this year

in the deaths of Sir Henry Rawlinson and Sir Edward Bunbury, and in 1890 in the death of Sir Henry Yule, that in the departments of historical and comparative geography we cannot claim to be quite in line with some of the countries whose representatives are about to visit us. The same attention has not been generally given to this very important branch of our work, as we find to be the case among our continental neighbours, and this in spite of the examples set by those whose recent loss we lament. The places of none of the three have been filled, nor can they at present be adequately filled by any living geographer in this country. I am anxious, therefore, to submit to my associates some reflections on the treatment of comparative geography by the leaders of our science, and on its uses; in the hope that, in this respect, we may endeavour in the future to keep to the front, and, inspired by the work of those geographical worthies who are no longer with us, that explorers and students may give closer attention to the former history of the subjects they may select for investigation, and to the elucidation of the narratives and researches of our predecessors.

D'Anville was the father of critical and scientific geography, but he was only a student; while the founder of geographical science in this country, Major James Rennell, had had a training of many years in the field before he devoted the later half of his life to the study of the work of those who had gone before him, and to the critical elucidation of the labours of his contemporaries. Rennell is the greatest geographer that this country has produced, and the model from which future aspirants to geographical fame should derive their methods and their systems of study and of work. We can examine Rennell's principles of investigation in the account he gives of any of his great works, perhaps most fully in the memoir accompanying his map of Hindostan. Before commencing its construction he collected all the information that was accessible to him, and discussed all the details with great care, bringing the acumen of a thoroughly logical mind to bear on the decision of each doubtful point, giving reasons for all his conclusions, and describing his authorities. He traced back the political divisions of the country, and their history to the time of Akbar, obtaining translations of the Ayin Akbari, and other works throwing light on the subjects of his inquiry. Thus, to establish the position of an important point on the Ganges, which was erroneously placed by D'Anville, it was necessary for Rennell to examine the works of Pliny and of Strabo, to discuss their measurements, and to compare the evidence thus furnished with the most recent information. In his great work on Herodotus, Rennell applied the same principles with equal success. His system may be summarized as one requiring alike an intimate knowledge of ancient writers, and of the work of modern explorers and critics; in which geography makes history intelligible, while history, in return, throws light on many important points in physical geography.

This is demonstrated, in a very striking way, in Rennell's volume dealing with the Africa of Herodotus. In his treatise on the delta of the Nile, and on the changes that have taken place in it, within historical times, Rennell had occasion to examine and discuss the statements of the ancients and their evidence respecting the changes in the channels, while his own extensive knowledge of the Gangetic delta enabled him to explain the causes of those changes. His remarks on deltas and estuaries, on the positions of river bars, and on their formation, and his application of these physical principles to the history of the Nile delta remind us that a geographer must be as well acquainted with the history of the region he wishes to explore, as with physical science. Rennell's treatment of the questions involved in the story of the circumnavigation of Africa by Phœnicians, as told by Herodotus, and in the Periplus of Hanno is so thorough that he may be said to have finally settled them. As regards the circumnavigation he made careful calculations of rates of sailing as given by Nearchus and other ancient writers, considered the effects of winds and currents, and based his conclusions on a critical examination of the evidence. Speaking of the Periplus of Hanno, Sir Edward Bunbury considers the arguments of Rennell, which have been adopted by later editors, to be conclusive, and says that "the merit of having established the true view of the question undoubtedly rests with the great English hydrographer." His examination of this problem is indeed a masterpiece of critical reasoning; and the same may be said of his paper on the topography of Babylon, in which he compared all the statements of ancient and modern writers with extraordinary acuteness and sagacity. Here again his conclusions have the concurrence of the latest authorities, such as Canon Rawlinson.

Exactly the same training, as regards historical geography, is required for an explorer as for a cartographer or a student. A very striking instance of the necessity for a traveller to study all that has previously been written on the region he has explored, is afforded by Mr. Curzon's important monograph on the Oxus. Our Vice-President had searched every authority from Istakhri and Edrisi to the latest modern visitor of the Pamirs, for any notice of the precise source of the Oxus. Several writers referred him to the more southerly or Panja branch as the originating stream, but none to the actual source, until he found such a notice in a memoir by Lieutenant Macartney, forming an appendix to Mountstuart Elphinstone's "Kingdom of Caubul." A native informant supplied Macartney with a correct description of the Wakh-jir source of the Oxus; and equally correct information is contained in the report of Pundit Manphul, printed in 1862 as an appendix to Davies' Trade Reports of the North-West Frontier. Both these sources of information had been overlooked by previous writers on the Oxus; but it is the special merit of Mr. Curzon that he never contents himself with mere exploration. He studies the history of the regions he visits with great

care, traces out the records of their cartography and the origin of errors in the maps, and makes an exhaustive and critical examination of all that has previously been written on the subject.

This is an example which ought to be followed by all explorers, for knowledge of the previous history of a region, and of all that has been written on its geography, is quite as essential a qualification as the ability to map a country and to fix positions. Otherwise the explorer is merely an instrument of research, directed by others, and supplying material for others to elaborate and discuss.

We find another pattern for writers of geographical memoirs in the memorable communications of the late Sir Henry Rawlinson, on his journey through Persian Kurdistan to the ruins of Takht-i-Suliman, and on the site of the Atropatenian Ecbatana. There may be only one Ecbatana site at Hamadan, or the illustrious geographer's theory may be correct as to the existence of another in Media Atropatene. My object in referring to these memoirs is not to uphold either contention, but to point out that no one but a geographer, trained to lay down his routes with accuracy, and with an eye to take in and comprehend the physical aspects of the country he traverses, was capable of discussing the question as Sir Henry discussed it. He was only twenty-eight years of age at the time, and I mention this to show that the combination of learning with energetic exploration need not be an attribute of advanced years. Every young explorer may be a Rawlinson, as soon as he is convinced that diligent acquisition of knowledge is as necessary for distinguished success as high courage and contempt of danger and of hardships. For, although young in years, Rawlinson was a ripe scholar when he left the camp at Tabriz in October, 1838, and set out on his adventurous journey. When he had completed his examination of the ruins at Takht-i-Suliman, drawn careful plans, mastered the physical aspects of the surrounding country, and considered all the routes leading across it, he proceeded to the identification of the site by the light of his profound knowledge of eastern history, and by a comparison of Persian manuscripts with Byzantine chronicles. But it must be remembered that this was done while still in Persia, not after returning to England, and coming within reach of great libraries. His critical method was a sure and safe one. He first verified the ruins of Takht-i-Suliman in oriental geography, then identified the name given by the early Arabs with one found in Byzantine writings, next he traced up the fortunes of the place through the flourishing periods of the Roman Empire, and finally came to the dark period of the Median dynasty, when the name of Ecbatana first appears. He thus set out from a fixed base of direct and well-established proof, and built up a superstructure upon a sure foundation. As his argument gradually ascended along the chain of evidence into fields of more remote inquiry, criticism could, at any point, withhold assent to his opinions, without

endangering the stability of any part of the preceding argument. So that later critics might reject the theory of a northern Ecbatana, apart from that at Hamadan; but such dissent in no way impugned the principal part of Rawlinson's argument by which he proved the origin of the name of Takht-i-Suliman, its identity with the Shiz of Persian and Arab writers, and the identity of Shiz with the Byzantine Canzaca. I have explained the method adopted by our late President, in applying his geographical researches and his historical learning to the elucidation of one of the great problems in Asiatic comparative geography, because it is identical with the method of D'Anville, and with the method of Rennell. But his memoirs convey to us a more important lesson. They prove to us that there is nothing to prevent a young explorer from making himself thoroughly acquainted with the previous history of any region he may select for the subject of his researches, before he commences his actual work in the field. If he only acquires such knowledge after his return, it will be a continual source of regret to him that he did not possess it when he was on the spot, when it would have guided him to fresh investigations of ever increasing interest. On this point I speak from my own experience; whereas, if he goes out fully armed with the results of study and research, he will find himself to be provided with advantages of inestimable value when he reaches the scene of his operations.

Such advantages are now easy of attainment when there is a strong wish to possess them, and the desire to do well, "Talant de bien faire," the motto of Prince Henry the Navigator. But this was not always the case. In former times there were often greater difficulties to overcome than there are now, and probably the very necessity for overcoming obstacles, and the persevering resolution which was thus engendered, was one cause of success. It is, therefore, very desirable that young geographers should study the life-work of their predecessors, and the methods through which they rose to eminence. The stories of the lives of great men who have devoted their best years to geographical work in the field or in the study are most instructive as well as interesting. While inciting the student to emulation, they teach him lessons of inestimable value, and guide him to the best methods in the conduct of his own researches. He may take for himself a pattern from among his predecessors, or still better he may select the best points from several examples among the *Dii Majores* of our science, and so form for himself an ideal to strive for, and if possible to attain.

In the case of James Rennell he will find a successful conquest of many difficulties, through perseverance, good conduct, and great ability. Beginning life as a midshipman in the navy with no interest, Rennell found himself without any hope of preferment at the close of the Seven Years' War; but he had made the best of his time, and had worked diligently during his six years at sea, losing no opportunity in practising

marine surveying and the construction of charts. He left the navy at Madras, volunteering for the service of the East India Company, and very soon afterwards he received a commission in the Bengal Engineers, and was appointed Surveyor-General. During the fourteen following years he completed the famous survey, and at the end of them he brought out the atlas of Bengal. In those seasons of each year when he was not employed in the field, he was an assiduous reader, and he acquired those habits of study combined with critical insight and power of assimilation, which secured for him, during many subsequent years, the most prominent position among the geographers of Europe. The greatest comparative and critical geographer that this country has produced, Major Rennell is an example of the success which attends the combination of knowledge derived from the study of books, with active work in the field. From this point of view, a contemplation of this illustrious man's biography, of his methods of research, and of the history of his literary labours, cannot fail to suggest ideas and habits which will be valuable for the guidance of those who aspire to follow in his footsteps.

Rawlinson had some advantages at the opening of his career, which were denied to Rennell; yet his success was equally due to his own merits. Selected, early in life, as one of the officers who were designated to organize the troops of the Shah of Persia, he devoted every spare moment to the study of the history of the region whither his duty had taken him, perfecting himself in the language, collecting manuscripts, and mastering the works of Greek authors, as well as the more modern publications on the subject of his labours, as a necessary preparation, and as an indispensable qualification for geographical exploration. This is the explanation of the remarkable fact that so young an officer was able to send home papers to this Society which, as Mr. Vaux has truly remarked, have thrown more light on the geography of the part of Asia he described, than any other work, ancient or modern. If Rennell is a model whose methods should be examined and imitated by all classes of geographers, our late President, Sir Henry Rawlinson, is assuredly the man whose example should be studied and followed, more especially by military men who become devotees of our science.

Our naval associates have many well-known names to refer to among those of their profession who have given special attention to geography, and have become leading members of this Society. Smyth, Colchester, and Beechey, who were our Presidents, Beaufort, Basil Hall, Fitz-Roy, and Franklin, Collinson, Washington, and Back are household words amongst us. The work of all is of permanent value, and that of the majority has been worthily recorded. But, from the point of view of the particular department of our science which I am now discussing, I should be inclined to mention the career of the late Admiral

Sherard Osborn as one which might usefully be recommended as an example, and as worthy of attention by naval geographers. Always devoted to geography, Osborn was in the habit of studying the history of discovery as it bore on the countries he visited from his earliest youth. Whether on the shores of the Malacca peninsula, or in the Pacific Ocean, or in the Arctic Regions, or in the sea of Azof, or up the Yang-tsze-kiang, Osborn, during his active service, never neglected his literary researches, and never forgot his journal. I may mention that while in the Pacific, as a very young officer, he made a special study of the river system of the Amazons, and of its capabilities as a route for commerce, tracing out the history of the principal voyages and of the discovery of its numerous tributaries; and that these studies bore fruit, in after years, when Osborn became a director of the Amazon Steam Navigation Company. The manuscript of his memoir on the Amazonian basin is now in my possession. His services in the Arctic Regions are matter of history, but the extent of his historical researches in connection with polar discovery is not so well known. Those researches were not confined to narratives of voyages, but included all that had been written on the Eskimo and Siberian tribes and their movements. The charm of his writings is derived from gifts which few possess, but their permanent value is due, in no small degree, to the thoroughness of his researches. Many still remain amongst us who remember Sherard Osborn's important papers read before this Society, and recall his bright and cheery face, his hearty greetings, and genial voice. He was one of the very best naval writers of his generation, and, in the publication of his narrative of Sir Robert M'Clure's voyage, his hope was that it might remain as the history of a great event in naval annals, and perhaps awaken in the breasts of future Franklins and Parrys that love of perilous adventure which must ever form the most valuable trait in the character of a maritime people. It was mainly to Osborn that the renewal of polar research in 1875 was due, and we hope that the memory of his arguments and of his heart-stirring appeals will not be without its influence in promoting the despatch of an Antarctic voyage in the near future.

But it is to Sherard Osborn's commendable habit of keeping a careful journal that I am anxious to call the attention of young officers who aspire to do useful work as geographers, for I know that many of them have that ambition, both in the navy and in the merchant service. The prizes given by our Council to the cadets of the *Worcester* and *Conway* are not given in vain. On the contrary, it is within my knowledge that they are having an effect which is most gratifying. By all such aspirants Sherard Osborn's advice, given in the preamble of his charming book entitled 'Quedah,' should be taken to heart. "The majority of naval officers are self-taught men," he says, "the world their book—the gunroom their *Alma Mater*. To these he would say

that to a steady habit of keeping a journal, noting down all he saw, read, or felt, and, in spite of all its shortcomings, still educating himself with his journal, he is mainly indebted for being able to fight his way up an arduous and emulative profession."

Hitherto I have dwelt on the services that geography has done to history, from the days of Herodotus and Thucydides to the days of Freeman. Explorers have shown the influence that the surface of the land, in its varied aspects, has had on the settlement and movements of the human race, and on the operations of war. Travellers have fixed the sites of cities and of battlefields, and have thus unravelled many a perplexing historical knot. Comparative geographers have explained obscure passages and solved historical questions which could not have been made clear without their aid. History has always looked to the science of geography for the way out of many difficulties, and for the solution of a large class of her problems, and she has never looked in vain. The search lights of geography have penetrated into many of the obscure periods of the story of our race, and shown ways which, without their help, would have continued to be wrapped in obscurity.

On the other hand, geography is equally indebted to the labours of the historian. I do not here allude to the changes on the earth's surface of the greatest importance and the deepest interest, of which we should know nothing if they had not been recorded in history. This part of the subject is so extensive that it would require much space, and might well occupy us during the whole time allowed for an anniversary address. Moreover, I have already treated of this phase of the subject to some extent in my paper at the Nottingham meeting of the British Association. But I would dwell upon the charm that historical reminiscences give to geographical work, whether it be the work of explorers or surveyors, or the mature labours of scientific students. It is also necessary, on many occasions, to elucidate a scientific geographical treatise, or the results of researches, by furnishing a thorough historical introduction.

Such an introduction was required for the report of the scientific results of the voyage of the *Challenger*, bound up in fifty large quarto volumes—a monumental record of continuous and diligent work, which may almost be said to have created that part of the science of oceanography treating of ocean depths, and, as Dr. Murray truly says, which marks the greatest advance in the knowledge of our planet since the celebrated discoveries of the fifteenth and sixteenth centuries.

As an introduction to such a work, it is necessary to trace the gradual development of our knowledge concerning the ocean from the dawn of history to the time of the *Challenger* expedition, and this has been done by Dr. Murray with a master hand. Dr. Murray's historical introduction is an excellent example of the necessity for a knowledge of past events, which the geographer feels in the adequate treatment of

every department of his science. In the study of oceanography he must be acquainted with the conceptions of the Phœnicians and the Greeks, and with the earliest authentic voyages. Dr. Murray explains the views of Aristotle concerning the phenomena of the sea, and the distribution of land and water, and points out that the Stagyrite's researches on marine animals were of distinct scientific value. A knowledge of the systems of Eratosthenes and Hipparchus and the other ancient geographers, and especially of the views held by Strabo respecting the sculpturings of continents and the level of the ocean, is also necessary for a student of oceanography; and these are ably described by Dr. Murray, as well as Pliny's ideas respecting marine organisms, and the whole system of Ptolemy; nor does Dr. Murray consider the speculations of the Arabs and the ideas of the schoolmen of the Middle Ages to be foreign to his subject; while a knowledge of the discoveries of Columbus and Vasco da Gama, of Magellan and Cabota, is clearly a part of the qualification for a student of oceanography. Magellan, indeed, was the first recorded navigator who attempted to make a deep-sea sounding. The nomenclature of the oceans, the adoption of hydrographic signs, and the introduction of isobathic lines on marine charts, are all points for an acquaintance with which the oceanographer is indebted to researches into the history of cartography, as well as for details as to the progress of knowledge respecting tides and currents. Lastly, the history of the views held by navigators and scientific men on the physical and biological conditions of the sea, and on the causes of oceanic phenomena, during the last century, must be familiar to the oceanographic student before he is duly provided with the necessary qualifications for his task. All these points are fully treated by Dr. Murray in the historical introduction which forms the opening chapter to the two final volumes of the great *Challenger* work, containing the summary of results. It is a treatise of the greatest interest, showing evidence of much careful research; and this is the first time that a history of the progress of knowledge respecting the phenomena of the ocean, from the earliest times, has been prepared by a fully qualified hand.

Dr. Murray's historical introduction, I repeat, is an excellent example of the uses of history in the study of the various departments of geographical science. Without a knowledge of all that has been done before his days, of the hypotheses that have been started and the discoveries that have been made, the student would waste much time, and would not be half armed for the service upon which he may be engaged. It cannot be too strongly urged upon the attention of the scientific student, as well as upon that of the surveyor and the traveller, that an exhaustive knowledge of the history of the work to which he is devoting his time and attention is an indispensable introduction to all progress. This, of course, is felt at once by many of those who enter upon the study of geographical questions, or on the exploration of little-known regions;

but the feeling is far from being universal, and I cannot think that it is out of place to insist upon the great importance of the acquisition of a thorough knowledge of the history of every geographical subject to be investigated, and of every region to be explored, as a preliminary to the commencement of work.

There is another way in which history confers a great boon upon the traveller, and that is by adding a charm to his wanderings, and by intensifying the pleasure he takes in every detail of the route he is engaged in exploring. From this point of view the relative importance of the passes leading across the Himalayas into India is made clear by a knowledge of the routes used by the successive conquerors, and of the circumstances under which their invasions were undertaken. With historical knowledge the wildest deserts and the barest and most dreary wildernesses receive a charm from the reminiscences which surround them. How monotonous would have been the work of Lieut. Kempthorne in the Persian Gulf, if his labours had not been enlivened and lightened by his attempts to identify the points of land and the fishing hamlets with the places mentioned in the voyage of Nearchus! How immeasurably is the interest of a journey from the plains of Mesopotamia to the Black Sea heightened by the work, so graphically described to us the other night by Mr. York, of tracing the Roman road and identifying the legionary stations! There is scarcely any part of the known world where a knowledge of history will not increase the interest of a journey and afford enjoyment to a lover of wild or beautiful scenery, as well as to the explorer of even the most monotonous coast line.

I may refer to my own experience in travelling over the Abyssinian highlands with the late Lord Napier's field force. As soon as we came on the track of the Portuguese Embassy of Rodriguez da Lima in 1520, which is quaintly described by Father Alvarez, the interest of the route was very materially increased. There was a ruin at a place called Agula. Without an acquaintance with the volume of Alvarez it would have been a ruin and nothing more. But when, after comparison of the routes and descriptions of the country, it appeared to be his "church of Quiricos at Angagui," * the whole interest, not only of the ruin but of the surrounding district, was greatly increased. I remember that it was while engaged on a plan of this ruin, now many years ago, that I first made the acquaintance of Mr. Henry M. Stanley.† "The place is very faire upon a very goodly river," says the translator of old Alvarez. Again at Meshik and at the Alaji Pass we came upon scenes well described in the narrative of the old monk; and the interest of the route was thus enhanced by historical reminiscences until we approached Lalibela, his city of churches. It will at once be seen how the dullest country, as well as the most beautiful scenery, is rendered doubly

* Alvarez (*Hakluyt Society*), p. 97.

† On February 15, 1868.

interesting when the imagination is able to clothe it with recollections of former travellers who have traversed the same route, or of memorable deeds performed on sites which the traveller's knowledge and discernment enable him to identify.

In the same way, the naval officers who are engaged in the severe and sometimes rather monotonous work of marine surveying, often not only have their interest in history aroused by the reminiscences connected with the coasts on which they are employed, but even acquire literary and scientific tastes which endure through life, as in the cases of Sir Francis Beaufort on the coast of Caria, and of Admiral Spratt in Candia; while our founder, Admiral Smyth, became a first-rate numismatist owing to the collections he had the opportunity of making on the coasts of Sicily and Africa. In the Straits of Magellan, too, the identification of capes, bays, and peaks mentioned by old Sarmiento, was a source of never failing interest to Captains King and Fitz-Roy, and their officers. Don Pedro Sarmiento was the best type of a Spanish sailor of the sixteenth century. After Sir Francis Drake traversed the strait and broke into the South Sea on board the *Golden Hind*, the Viceroy of Peru sent an expedition under Pedro Sarmiento to explore this passage from the Atlantic and to report upon the feasibility of fortifying it, so as to prevent any further piratical depredations. The veteran sailor thoroughly explored all the intricate channels leading from the Gulf of Trinidad in three boat voyages, and then made a running survey of the Strait of Magellan. He was the first navigator who gave a detailed and intelligent description of the strait. The English surveyors, under King and Fitz-Roy, and afterwards those under Sir George Nares, were delighted with this ancient mariner's work, and found, in the identification of his names, a source of interest and pleasure which lightened their arduous and trying service. Thus the *Alert* was kept swinging to and fro, and circling round her anchors, by the heavy squalls from various quarters, in the very place which Sarmiento had named—"a box on the ear from the Devil." The snowy mountains he described were named the "Cordillera of Sarmiento" by the English officers. "The ancient Spanish mariner's 'Hill of the New Year,'" continues the narrative, "cannot be mistaken, indeed the whole of the coast is so well described by Sarmiento that we have little difficulty in determining the greater number of places he visited. In all cases we have, of course, preserved his names." Indeed, his names have been retained, wherever they could be identified, throughout the strait. "Any name," says Fitz-Roy, "which was given by this excellent old navigator is too classical and valuable to be omitted;" and it was with real pleasure that Fitz-Roy christened the lofty snowy peak seen from Port Famine, which was well described by his Spanish predecessor, with the name of Mount Sarmiento.

This is one more instance, out of a great number, showing the interest

which is always to be found in the former history of any locality that has to be explored or surveyed. There can be no doubt that an acquaintance with the surveying work executed by Pedro Sarmiento in 1580, very much increased the interest of the arduous service on which Captain Fitz-Roy and his officers were employed, and it undoubtedly enhances the pleasure of the reader in perusing the narrative of their survey.

I have endeavoured, in thus illustrating the points I am anxious to establish by actual examples, to bring them more forcibly before my associates, and, by convincing their understandings and engaging their imaginations, to secure such attention for them as will eventually bear fruit. They may now be briefly summarized. The geographer, whether he be a student or an explorer, who acquires a thorough knowledge of the previous history of his subject, more than doubles the pleasure to be derived from his labours, while it enables him to make them infinitely more useful. His best preparation for these studies, as well as for subsequent work, is an acquaintance with the methods of those leaders of our science who have gone before him, and with their life stories—of such men, for instance, as Major Rennell, as Sir Henry Rawlinson, and as Admiral Sherard Osborn. This preparation enables the comparative geographer to do most important service to history. In return, he derives from history the knowledge which is essential to the full comprehension of the various branches of his own service, and he also obtains from history the means of immensely increasing the interest and charm of his researches, whether conducted in the study or in the field.

It is by considering the best means of maintaining the high position now held by geography from a similar point of view that we arrive at another conclusion. Retrospects, as has been seen, are necessary for the execution of really valuable geographical work. They are also of service in reminding us of the great deeds and illustrious lives of our predecessors; and thus a conviction of the useful results to be derived from the commemoration of anniversaries is forced upon our minds. Such celebrations are to be commended on several grounds. It is very desirable that from time to time we should set apart these special days for a contemplation of the lives of the most important worthies among our geographical ancestry, for a consideration of their methods and of the ways in which they attained to greatness, and for a contemplation of their achievements. Those who take part in these commemorative celebrations use that opportunity of refreshing their memories by a renewed study of a particular period or phase in the history of our science. Our younger associates have their enthusiasm aroused, and have examples set before them which they are incited to emulate. The ceremonies themselves are both interesting and instructive; and we have found that they have a tendency to connect us with our brother geographers in

other countries by closer ties of sympathy and friendship. The celebration of the Columbus centenary, to which we devoted an evening in 1892, was gratifying to our brother geographers in Italy and Spain. That of Prince Henry the Navigator, in which H.R.H. the Duke of York took part, was welcomed in special telegrams from the King of Portugal and from the Lisbon Geographical Society. Our recent commemoration of the anniversary of the departure of Sir John Franklin's expedition brought back to us memories of past heroic achievements, and renewed the generous feelings which were aroused at the time by the cordial sympathy of France and of the United States. For all these reasons it seems well that the Society should, on fitting occasions, take special steps for doing honour to the memories of the *Dii Majores* of geographical science.

In what I have said on the great importance of cultivating the historical side of geography, my hope and expectation has been that some of the arguments I have employed may strike the imaginations and have some influence on the views of the working sections of my associates. A great number, I do not doubt, needed no such reminder to strengthen convictions which they already entertain. But the matter may not have presented itself in the same light to many of us, and as regards these I would fain hope that my words have not been entirely wasted. The presence of many famous comparative geographers at the Congress will also have an effect upon us, and I sincerely trust that before many years we shall find ourselves in line with our colleagues in this, as I believe we already are in most of the other departments of our science.

Since I announced to you the progress of our efforts to create in the public mind a feeling of the importance of despatching an Antarctic Expedition, those efforts have not been relaxed. The Council of the Royal Society referred the question to a Committee last year, and the admirable and convincing Report of that body is dated in May, 1894. The Committee dwelt mainly on the results to be derived from Antarctic research with reference to a magnetic survey, showing that the expedition was a necessity from the point of view of terrestrial magnetism alone. Reasons were also adduced to show that the best time for such an expedition, as regards magnetic observations, would be in the next year or two. Last December the Council of the British Association passed a strong resolution in favour of an expedition, at a meeting when the Marquis of Salisbury was in the chair; and we have since received similar encouragement from all the principal scientific societies in Great Britain, as well as from the Australian Association for the Advancement of Science. The Governments of the Australasian Colonies have also been addressed on the subject, and a reply has been received from New Zealand, of a favourable character. With the object of informing and enlisting public opinion in our favour, I read a paper

on the Antarctic Expedition from a colonial point of view at the Imperial Institute on the 4th of March, which was well received; and on April 10th I delivered an address on Antarctic exploration from a naval point of view at the United Service Institution, which was followed by an enthusiastic discussion, leaving no doubt with regard to the feeling of the navy on the subject. The next steps will be to decide upon the *personnel* of an influential deputation in concert with all the other societies, and upon the best time for approaching the Government on the subject. We are backed by the unanimous voice of all our scientific corporations, and I have every reason to believe that we shall be supported by the press and by public opinion. If this be so, we may consider final success to be certain. But be this how it may, I now repeat what I said when Dr. Murray's paper on the renewal of Antarctic exploration was read on November 27, 1893, that I for one will never swerve from the task of obtaining the despatch of an Antarctic expedition while I occupy this chair. At the same time, I believe, with Dr. Murray, that a Prime Minister "will be found sufficiently alive to the spirit of the times, to carry through an undertaking worthy of the maritime position and the scientific reputation of this great empire." Captain Larsen's Antarctic discoveries to the south of the South Shetland Islands, and the more recent voyage of the *Antarctic* to Victoria Land, have had the effect of keeping up an interest in the subject.

In the far north our interest is fixed on the proceedings of the expedition to Franz Joseph Land, so munificently equipped by Mr. Alfred Harmsworth, and commanded by Mr. Frederick G. Jackson. Its plan is for nine explorers to land on the shores of Franz Joseph Land with houses both of heavy logs mortised together, and of canvas and light planks, for their depôts and observatory. From these headquarters the exploration and discovery to the northward is to be conducted by dog-sledges and two aluminium boats, depôts of provisions being established at proper intervals. Mr. Harmsworth has equipped the expedition with a judicious liberality which is worthy of the very best days of our merchant princes; and the care with which Mr. Montefiore has attended to all the details of supply, many of them requiring much thought and investigation, is above all praise.

I went on board the *Windward* at Greenhithe, on July 12, 1894, to see the last of the gallant adventurers, and we gave them three hearty cheers on leaving the ship. The eight Englishmen to whom, as well as to their leader, is entrusted, for the time, their country's Arctic fame, were standing right aft as the *Windward* gathered way, together with Mr. Montefiore, grouped round their commander, Mr. Frederick Jackson. There stood young Armitage, the astronomical observer, formerly a *Worcester* cadet, and arousing the enthusiasm of his young successors by the splendid example he was setting before them; for the *Windward*

had come-to within a few hundred yards of the old *Worcester*.* There were Reginald Kettlitz, the medical officer and geologist; Harry Fisher, the botanist; Dursford, the surveyor; F. J. Child, the mineralogist and photographer; Sidney Burgess, and John Heywood, the youngest of the party. We shall hear all these names again, I trust, in connection with many gallant exploits. We certainly heard their possessors on that July afternoon, as their returning cheers resounded on the water.

The *Windward* arrived at Archangel on July 31, where winter clothing and log houses in pieces were embarked, as well as four little ponies. Sailing on August 5, thirty dogs were taken on board at Khaborova, and the expedition then proceeded on her adventurous voyage. She was last seen in the end of August by the *Betsy* walrus sloop, in 70° 45′ N. and 44° E., steaming up an open lead in the ice. I trust she safely reached her harbour on the coast of Franz Joseph Land. The *Windward* has not returned after landing the explorers, as was intended, but this contingency was foreseen, and eighteen months' provisions were supplied for her crew of twenty-three men. The explorers themselves are provisioned for four years. It is not Mr. Harmsworth's intention to send out a vessel to communicate with them in the present year; but in 1896 a ship will, in any case, be despatched with stores and provisions, and two or three good men to replace any who may be invalided. There does not, therefore, appear to be cause for special anxiety as yet, and on the return of the *Windward* this summer or autumn, I earnestly hope that we shall receive a prosperous account of work happily begun, and of the good health and well-being of our gallant fellow-countrymen.

Arctic and Antarctic subjects will receive attention at the coming Congress, with many others. Among them there is one to which my attention has been specially called respecting the need for more accurate surveys in Africa, and which I feel bound to notice in my Address.

The time is approaching when rough exploring work will be less required, and when surveys of some accuracy will alone be of value, while generalization and the discussion of accumulated data will become increasingly important. Last March I received a letter from Lieut.-General E. F. Chapman, which places the requirements of the political and commercial geography of Africa in an important light. He reminds me that there are large portions of that continent which have been for years occupied by European settlers, and under civilized administration, of which no accurate maps exist. General Chapman suggests that the occasion of the meeting of the International Congress in London offers an invaluable opportunity for considering how a reasonably accurate and complete map of Africa can be built up, and for urging upon the

* Captain L. Henderson Smith, R.N.R., has requested me to express his regret that he was unable to be present on the departure of his old pupil, Mr. Armitage.

different Governments and Geographical Societies the advantages of united action. Triangulation surveys have been executed, or are in progress, in Cape Colony, Natal, Bechuanaland, Lower Egypt, and in Algeria and Tunis, as well as in Erythræa. General Chapman urges that, in regions beyond the range of geodetic surveys, travellers should make surveys of areas rather than of routes, and that such surveys should be based on theodolite triangulation wherever it is possible. A complete record should be collected, as regards Africa, of all the positions that have been fixed astronomically in areas that have not been triangulated, and measures should be adopted for the purpose of determining new positions. These suggestions will engage the attention of the International Congress, and there is every reason to hope that they may lead to representations being made to the civilized states of Africa with reference to the importance of carrying out geodetic surveys; and to the execution of surveys in the unsettled parts, on the system proposed by Colonel Trotter at the Cardiff meeting of the British Association.

This is, however, only one of the important questions which will be brought forward for discussion at the International Geographical Congress. The programme which has already been prepared embraces all the different departments of our science. Major Darwin, as Chairman of the Organizing Committee, and the two Secretaries, Mr. Keltie and Dr. Mill, have worked hard during the last two years, and have planned out a comprehensive scheme for the work of the Congress; while the labours of Mr. Ravenstein and Mr. Coles, in connection with the geographical exhibition, have been indefatigable, and will secure that the best possible arrangements are made. In his remarks on the International Geographical Congress, held at Venice in 1881, our lamented ex-President, Lord Aberdare, said that "it was hardly possible to bring together men of science and travellers, from all parts of the world, to discuss the questions still unsettled, and those which may be called the questions of the future, without some advantage arising from their meeting." I fully concur in this view of the uses of such an assembly, and I therefore anticipate important results from the great gathering of scientific men, all devoted to the advancement of geography, who will visit our shores two months hence. It will be our agreeable duty to welcome them, to make them feel at home amongst us, and to endeavour to derive all possible benefit from the great stores of knowledge which they will be ready to impart to us; while we vie with each other in our efforts to show them all that we possess which is worthy of their attention, and to make their stay as pleasant and agreeable as possible. We must endeavour to entertain our foreign guests in such a way as that they will regret that the end of their visit has come, and leave our shores with friendly and agreeable impressions of their hosts. I am confident, from long experience, that the Fellows of the Society will

combine together heartily and patriotically, and resolve to make the assembly of the International Geographical Congress in London a great and memorable success.

Admiral Wharton, the Hydrographer, has kindly furnished me with a brief summary of a Report on the work of the surveying vessels during the year 1894, which is about to be presented to Parliament.

Re-surveys have been executed on the coasts of Great Britain and Ireland, where both the home surveying vessels, the *Research* and *Triton*, are commanded by Fellows of this Society, one of them an old Arctic officer. On the western side of Newfoundland, a part of the coast from Cape St. George to Long Point has been surveyed, which had not been examined since it was partially explored by Captain Cook in 1765. A systematic examination of the Dacia bank in the Atlantic was made, and some soundings were taken in the Red Sea in search of shallow water reported south-east of the Hanish group. Surveys have been made at Benguela and Walfisch bays on the west coast of Africa. In the Mediterranean the *Stork* was employed in the re-survey of the Maltese Islands. A survey of the port of Argostoli in Cephalonia was also executed.

The *Dart*, still under the command of that indefatigable surveyor, Commander Herbert E. Cust, was at work among the Melanesian Islands, where the surveys of the islands of Ambrym and Pentecost in the New Hebrides group were continued. A violent eruption took place on Ambrym on October 16, causing streams of lava to flow from the central crater, one of which entered the sea, close to the ship, and the surveying operations had to be suspended owing to the dense clouds of smoke and dust. As a possible line of the proposed Pacific cable, a series of deep-sea soundings was obtained between Queensland and the Solomon Islands by the *Penguin*, which was also employed on surveys in the New Georgia Islands in that group.

Some surveys, including the inner route on the Queensland coast, have also been proceeded with in Australia and Tasmania.

As many as 93 new charts have been published by the Hydrographic Office during the year 1894, and 38 have been improved with new plans. The work of the department and the demand for charts appears to have increased very considerably during the last fifteen years, the number of corrections on chart plates from 2040 to 4648, and the number of charts printed from 192,060 to 315,867.

Admiralty Surveys during the Year 1894.

Under the orders of the Lords Commissioners of the Admiralty, hydrographical surveys have been in progress on the shores of the United Kingdom, the west coast of Newfoundland, Mediterranean, Red Sea, Australia, Tasmania, Solomon and New Hebrides groups, and the west coast of Africa.

These surveys have been carried on by eight steam-vessels of war, and three small hired steam-vessels, manned by 75 officers and 627 men.

Naval surveying officers have also been employed, with the sanction of the Admiralty, under the Indian Government. The results of their labours are also mentioned herein.

A detailed report of the labours performed by each surveying vessel has been prepared, and, in accordance with custom, will shortly be presented to Parliament, of which the following is a brief summary:—

The number of rocks and dangers to navigation, reports of which are being constantly received, show only too clearly the importance of detailed surveys on a large scale, at any rate in those waters which are much frequented by shipping. During the year 1894 no less than 164 of these dangers to navigation were reported to the Hydrographic Department, which required to be notified to the public by Notices to Mariners.

On the shores of the United Kingdom a survey was made of the approaches to Whitby and the entrance to the river Esk. In the Humber, the banks and channels opposite the town of Hull were re-sounded, when considerable alterations were found to have taken place since the previous survey; the Hull middle shoal having encroached greatly on the deep-water space, there is now no berth for a first-class battle-ship off the town of Hull. The Bull sands at the entrance to the Humber were found to have silted up considerably, there being now only 9 feet over them in parts, where heretofore 15 feet was charted.

A large area in the North Sea, opposite the Yorkshire coast, was sounded out in continuation of the work commenced in preceding years; in the estuary of the Thames an examination was made of the Shingles patch in the Duke of Edinburgh Channel, and a re-survey of Sheerness bar and vicinity carried out.

The re-survey of Spithead and approaches which had been commenced the previous year was continued, and completed with the exception of a few small patches. It is satisfactory to find that the changes of depth since the last survey of this important sheet of anchorage water are comparatively trifling.

At Plymouth, the survey of the Hamoaze from Mutton Cove to Saltash bridge was completed, and the river Tamar re-sounded up to Cargreen wharf. Dredgers having been at work in the Sound near the breakwater necessitated the re-sounding of a considerable area on a large scale, and resulted in showing that over various patches the full depth had not been obtained.

In Milford Haven, Pembroke reach was re-sounded on a scale of 28 inches to the mile, and showed that slight changes had taken place since the previous survey. In continuation of the work of the previous year, the survey of the north coast of Anglesea was resumed at Lynus point, and completed as far as the Menai straits, the northern approaches to which were also taken in hand. During the progress of this survey several banks were charted in Dulas bay, and southward of Lynus point, but no danger to navigation was discovered.

A re-survey of Ardrossan harbour and approaches revealed the existence of numerous rocks and shoals hitherto uncharted.

The entrance to Wexford harbour, which had been commenced the previous autumn, has been completed. Considerable alteration has taken place since the survey in 1881, but the depth over the bars remains the same, although the courses of the deepest channels are subject to constant change.

On foreign and colonial shores:—On the west coast of Newfoundland, the survey of St. George's bay was completed, and the coast from Cape St. George northward to Long point, including the whole of Port-au-Port, was thoroughly surveyed. As this region had previously only been partially explored by Captain

Cook in 1765, this survey disclosed material differences along the whole coast included in the season's work in contour, geographical position, and off-lying shoals, several of which were found, but none at a greater distance than half a mile from the land.

In the Mediterranean the re-survey of the Maltese islands was proceeded with. The eastern coast of Malta from Valletta to Hajira Seuda was completed, when several rocks and shoal patches, hitherto uncharted, were discovered. The north-east coast of Gozo from Ras il Kala to Kolla Baydha was also completed in detail.

A survey of Port Argostoli in Cephalonia and its approaches was taken in hand, and by the end of the season the entrance and greater portion of the port had been completed. Meridian distances were also obtained between Malta, Cape Matapan, and Argostoli.

On the passage home to England from China one of the surveying vessels obtained lines of deep-sea soundings between Penang, Colombo, and Aden, and also in the Mediterranean. While in the Red Sea an area to the south-eastward of the Hanish group was sounded, and a cursory examination made of the area in the vicinity of a sounding of 18 fathoms reported as having been obtained by a mail steamer in December, 1892, about 7½ miles to the westward of the dangerous Avocet rock. Though the bottom was found to be very uneven, the least depth obtained was 35 fathoms, and that only once, the general depth around it being 45 to 47 fathoms. This search cannot be considered conclusive, as a shoal head of small dimensions may require most detailed and systematic search before it can be discovered.

On the east coast of Australia a detailed survey was made of Jervis bay, a commodious and land-locked sheet of water much frequented by H.M. ships.

As one of the possible lines for the proposed Pacific cable, a series of deep-sea soundings was obtained between Queensland and the Solomon islands, which included a search for the Ocean Ranger reef, a danger reported to exist by a vessel of that name in 1891. Several days were spent in searching for this danger, but without success. On more than one occasion heavy tide rips were observed with every appearance of shoal water, but on examination it was found that deep water existed in such places.

In the Solomon islands the survey of New Georgia and surrounding islands was continued, and by the end of the year Blackett strait, north coast of Wana-Wana, south coast of Kulambangra, with part of Kula gulf, had been completed, as well as a considerable part of the north coast of New Georgia. During this season, as during the last, no difficulty was experienced with the natives, although their character as inveterate head-hunters is well established.

On the Queensland coast the survey of the inner route was continued, and completed in detail from Cape Grenville as far south as Restoration island, while the triangulation was carried down from thence to Chapman island. During the progress of this survey three pinnacle rocks close together, with deep water between, were discovered about three-quarters of a mile westward of the track recommended, at a part of the route where steamers have been in the habit of steering rather to the westward of the track during the night to avoid the horn of a projecting reef; this discovery is, therefore, of great importance to vessels of deep draught.

In Tasmania a survey was made of Frederick Henry and Norfolk bays on the north side of the Tasman peninsula, both of which are fine land-locked harbours, in which there is anchorage and manœuvring room for the largest fleets.

The survey of the New Hebrides group has been continued; the north coast of Ambrym and west coast of Pentecost island having been completed, while large scale plans were made of various anchorages. On October 16, while the ship was

at anchor off Ambrym island, having just completed the survey of the north coast, a violent eruption took place on that volcanic island, causing streams of lava to flow from the crater near the centre of the island, one of which entered the sea close to the ship, and presented a magnificent spectacle. On account of the dense clouds of smoke and dust, all surveying operations in the vicinity had to be suspended, but the vessel was employed rendering assistance to the natives, and making observations on the various interesting volcanic phenomena that occurred.

In the Atlantic Ocean a systematic examination was made of the Dacia bank in lat. 31° 10′ N., long. 13° 35′ W. It had been reported that a sounding of 12½ fathoms had been obtained on it, but the least water found on this occasion was 47 fathoms, after a careful search had been made extending over a period of four and a half days. Deep-sea soundings were obtained between Cape Bojador and Sierra Leone, and some deep soundings with serial temperatures in the Guinea and Equatorial currents, with current observations to a depth of 200 fathoms.

On the west coast of Africa surveys were made of Benguela, Great Fish bay, and Walfisch bay. A line of deep soundings was also obtained from Walfisch bay to the south-westward as far as lat. 35° 16′ S., long. 3° 6′ E., and from thence to the Cape of Good Hope.

Careful magnetical observations were obtained at Benguela, Great Fish bay, Walfisch bay, Simons Town, Cape Town, Cape of Good Hope, etc., as well as on the voyage.

In India the survey of the Coromandel coast was completed from Kristnapatam to Madras, a distance of about 75 miles. The survey of Palk strait north of Ceylon, to ascertain if a channel existed between the shoals, was also commenced at Point Pedro, and completed as far as Karrativo island before the close of the season. On the west coast, a survey was taken in hand of the coast embracing the mouths of the Indus, and completed from Manora point to the Hajamro mouth of the Indus, a distance of 50 miles, while the soundings were carried out to a distance of about 20 miles from the shore.

During the year the Hydrographic Department has published 93 new charts, improved 38 charts by the addition of 45 new plans, and made 4648 corrections to the chart plates. The number of charts printed for the requirements of the Royal Navy, for Government Departments, and to meet the demands of the general public, has during 1894 amounted to 315,867.

GEOGRAPHY AT THE UNIVERSITIES.

THE following reports for submission to the Council have been sent by the Reader in Geography at Oxford, and the Lecturer in Geography at Cambridge :—

Oxford, May 30, 1895.

During the past academic year I have delivered my usual courses of lectures. In the Michaelmas and Hilary Terms they were addressed more especially to undergraduates reading for Honours in History, and in the Summer Term to members of the Day Training College. The statistics of attendance stand thus—

Michaelmas Term: 33 men from 11 colleges; 17 ladies from 3 halls.

Hilary Term: 47 men from 16 colleges; 19 ladies from 4 halls.

Summer Term: 3 men from the Day Training College.

In the first two terms the numbers were larger than in the previous year. In the last term there was a smaller class than before, because fewer students have this year joined the Day Training College.

The electors for the Geographical Studentship were the President of the R.G.S., Major Darwin, the Warden of Merton, the President of Magdalen and myself. Our choice fell on Mr. R. T. Gunther, B.A., of Magdalen College. Mr. Gunther will prosecute researches in physical geography in the Phlegræan fields of Naples. Mr. C. R. Beazeley, the student elected in 1894, has recently published a work on Prince Henry the Navigator. It is noted with interest, moreover, that Mr. G. B. Grundy, the student of 1892, last week received a grant of £25 from the Convocation of the University to assist him in exploring the island of Sphacteria.

Accurate records of attendance at the lectures of the Reader have now been kept for five years, and it may be useful at the present moment to summarize the results. Since the beginning of Michaelmas Term, 1890, 337 members of the University have passed through my classes, about one-fourth of them having followed more than one course of instruction. Every college in the University has contributed to this total. Since the beginning of Michaelmas Term, 1892, there have been, in addition, 77 "registered" lady students. Each year the lectures have been attended by foreign students resident for a time in Oxford, especially American, French, and Norwegian. I cannot help feeling that what we now most urgently need is the means of giving a more complete geographical training to a select few of our students.

I have received invitations to lecture on geographical method at various centres in the country, and have given an address on that subject to the Sheffield Branch of the Teachers' Guild, and, in London, to the Geographical Association of Public Schoolmasters.

During the past year I have delivered, at Gresham College in the City, a course of 25 weekly lectures on the "History of Geography." The course was under the joint auspices of the Royal Geographical Society and the London University Extension Society. It was intended primarily for teachers, and the Education Department makes an allowance of 60 marks in the Queen's Scholarship Examination to pupil teachers in their last year of training who pass the examinations held in connection with these lectures. At the ten lectures given before Christmas there was an average attendance of 149, of whom 102 were present also at the weekly class supplementary to the lectures, and 42 on an average sent in weekly essays. For the correction of the essays I had the able assistance of Mr. W. G. de Burgh, M.A., of Balliol College, Oxford. The examination was very kindly undertaken by the President of the R.G.S. He awarded certificates to 44 students, to 6 of whom he gave the mark of "distinction."

At the ten lectures given between Christmas and Easter, 114 of my audience continued their attendance, 102 came to the weekly class, and 37 on the average wrote essays. On three occasions I was absent owing to illness, and my place was most kindly and efficiently taken by Dr. H. R. Mill, who conducted the Easter examination. 47 students obtained certificates on that occasion, 15 of them with distinction.

The course has been continued since Easter, the audience being slightly smaller, but the number of attendants at the classes and of essayists remains as before. Towards the close of the summer those students who obtained "distinction," either in the Christmas or in the Easter examination, will be allowed to submit a thesis on some special part of the subject, which, if accepted, will entitle them to the Honours Sessional Certificate of the U.E. Society.

The students were drawn from all parts of London. The lectures were illustrated by maps projected on the screen, and were accompanied by a printed syllabus.

H. J. MACKINDER, M.A.

Cambridge, May 20, 1895.

My first year's work here having been chiefly devoted to Physical, during the past session I lectured on Historical Geography. A special lecture at the opening of the session, at which the Vice-Chancellor kindly presided, attracted large numbers, and roused considerable interest. The attendance at the regular courses of lectures was similar to that of last year, the satisfactory beginning then made being maintained. So far experience shows that, while special lectures command large audiences, the attendance at continuous courses will be limited as long as geography is not recognized in examinations. To obtain this recognition efforts are needed, and in order to be in a better position to push the claims of our subject, I have proceeded to the full degree of M.A. in this University.

In the summer of last year I gave my third and concluding courses of lectures at the Owens College, taking for subjects "North America" and the "History of Geographical Discovery." The standard of work done showed a considerable advance, and the attendance an increase, the numbers present being thirty-two and eight. A good foundation has been laid there, which should lead to satisfactory results.

During the winter I limited my work outside the University, but delivered several lectures to large audiences, notably at Chester and Burton-on-Trent.

In the University Local Examinations, which have a wide influence, some useful modifications have been made on my advice.

As to the future, there are several promising signs, not the least being the number of inquiries from well-qualified candidates for the Geographical Studentship for next year. Though offered for some years past, this studentship has never yet been awarded, from lack of a suitable candidate.

H. YULE OLDHAM, M.A. (Oxf. and Cam.).

THE INDIAN SURVEYS, 1893-94.

By C. E. D. BLACK.

THE aggregate area surveyed on all scales during the year ended September 30 last, amounted to 127,477 square miles, this being exclusive of that embraced by the traverse operations in the Central Provinces, carried on for the purpose of supplying a basis for field surveys under the Settlement Department, and of the skeleton survey of village boundaries in Bengal, which together amounted to 3572 square miles. The general out-turn was the work of twenty parties and four small detachments, who were engaged on the various classes of survey and scientific operations, which fall within the usual scope of the Indian Surveyor-General's Department.

Triangulation in Burma was extended northwards for a distance of 90 miles along the meridian of 96° 30′ E. long., while along the coast of the Indus delta in Sind, thirty beacons were erected, at a distance of 70 miles south-east of Karachi, for the operations of the Marine Surveyors, who will be examining this shifting coast later on.

The Baluchistan topographical party, divided into four detachments, got through some important work. Captain Mackenzie extended the triangulation into the Zhob valley, before he was transferred to

the Domandi section of the Afghan Boundary Delimitation Commission. Lieutenant Macaulay, R.E., with two native assistants, triangulated about 1100 square miles, and topographically delineated an area of equal extent, in connection with the same Commission in the Kurram district. Mr. Claudius was at work on military surveys round Rawal Pindi, where he was joined by Khan Sahib Abdul Guffar and Atma Ram, who had previously completed between them some 4574 square miles of survey on the ½-inch and ¼-inch scales, in the Gilgit region, amongst some of the highest mountains of the north-west Himalayas. Mr. Wainwright, with four of the best native assistants, surveyed 2508 square miles of ½-inch survey in the difficult districts of Las Bela and Wad during the cold season 1893–94. Work here was hampered through the hostility of the Brahuis, but no actual contretemps occurred.

Colonel Holdich has taken the opportunity to put together in the present report an interesting note on the antiquities, ethnography, and history of Las Bela and Mekran, which, combined with the fruit of his previous researches in the same field, furnishes a most valuable addition to the history of this hitherto comparatively unknown country. The importance of Mekran may be gauged from the fact that Colonel Holdich styles it "the 'Open, Sesame!' of India and connecting passage between west and east."

Further to the west, Yusuf Sharif, Khan Bahadur, covered about 19,000 square miles of triangulation, working from an independent base measured by himself at Jask, on the Persian coast. In spite of the opposition of the local chiefs in the Bashkurd country between Bandar Abbas and Jask, he succeeded in mapping out 10,090 square miles of this country, while his assistant, Jamaluddin, added another 1700 square miles. Imam Sharif, Khan Bahadur, brother of Yusuf Sharif, was attached to Mr. Theodore Bent's exploring party in Southern Arabia, where, as is known to our readers, he rendered a most creditable out-turn of 12,000 square miles of previously unmapped country under difficult and even dangerous conditions.

During the last cold season the Baluchistan party have furnished the survey staff for the four different sections of the Afghan Boundary Commission, while the small remnant of the party have continued the military surveys on the borders of Baluchistan and some minor work round Multan.

The Aden detachment, under Mr. G. P. Tate, completed a survey of the Aden Peninsula on the scale of 8 inches to the mile, and also a larger scale survey of the Aden and Steamer Point cantonments. The attention of the party was then turned to the portion of the Yafi'i country left unfinished by Major Wahab, R.E., in 1891–92. Accompanied by an escort of Aden troops, Mr. Tate and his party set to work in the region referred to, which is mountainous and difficult of access, some of the highest points rising over 7000 feet in height. Moreover, malarial

fevers prevailed, and Mr. Tate and all the party suffered severely. Owing to the friendliness of the Yafi'i Sultan and the excellent arrangements made by the native Assistant Resident from Aden, no opposition was experienced, and the work was satisfactorily brought to a conclusion. Mr. Tate drew up an interesting description of Aden and the country of the lower Yafi'i, with a brief sketch of the history of Yemen, which has been separately published.

The direction of the tidal and levelling operations was in the hands of Lieutenant-Colonel J. Hill. The former observations were carried on at thirteen stations, two of which (Mergui and Bhaunagar) were closed on the completion of five years' registration. Since the resumption of systematic tidal operations in 1877, observations have been taken at thirty-three tidal observatories in all, of which twenty-two (including Madras) have been closed on the completion of their registrations, and eleven are now in operation.

The lines of levels consisted of a continuous line of double-levelling from the Sakti Station of the Bengal Nagpur Railway to Sambalpur, and thence across the Mahanadi to Cuttack, closing at Kendrapara, near False Point tidal station, and thus connecting Bombay by levelling with False Point and Calcutta. The lines were carried by Mr. J. Bond over rough and hilly country, covered with jungle and intersected with numerous water-courses—a difficult and unhealthy region, in which he and his detachment suffered much from illness. The result, however, as deduced by calculation from the point of origin, was only 1 foot 4 inches higher than that derived from the tidal observation at False Point, while the distance between the two points is 1185 miles.

The Burma party, No. 11, was divided into two detachments, one of which, under Colonel Woodthorpe, continued the delimitation of the Anglo-Siam boundary commenced the previous season, while the other, under Lieutenant Ryder, was engaged in the geographical survey of the south-eastern Shan States. The Anglo-French Commission, which started last November for the purpose of examining the contemplated neutral state on the Mekong river, was accompanied by Colonel Woodthorpe, Lieutenant Ryder, and two native surveyors. The other Burma party, No. 21, under Captain Longe, was split up into four detachments, which had, *inter alia*, to map out the country about Fort Stedman (97° E. long. and 20° 30′ N. lat.), and to delineate the Chin-Manipur boundary. On completion of this boundary work, sub-surveyor Mahomed Latif was told off to accompany the Manipur section of this commission on their return journey to Manipur, for the purpose of mapping the country *en route*, and also surveying a gap to the south-east of that state. This was successfully carried out, the sub-surveyor covering in a very creditable manner an area of 1054 square miles, on the $\frac{1}{4}$-mile scale, of hitherto unknown country in the hills west of the line Manipur-Tammu. The total out-turn by this detachment on the Chin-Manipur hills,

including the boundary work, comprised the survey of 2550 square miles of difficult and intricate country. During the course of the operations Captain Longe and some of his followers were upset off a raft while crossing the Manipur river at night, and a treasure-chest, a box of ammunition, and a number of photographic negatives were lost or destroyed. The bulk of No. 21 party, under Captain Gordon, was engaged in the topographical survey of the southern Shan States, over 1000 square miles being covered by these operations. The climate here is excellent, and Captain Gordon remarks that a *tonga* service might be organized, which would bring one from Rangoon or Mandalay to a climate as good as Bangalore or Dehra Dun in little over 24 hours. The country is rich in minerals; lead ore is extensively mixed in the Bawsaing State, where the ubiquitous Chinaman, who is always to the fore where money is to be made, holds the contract for melting lead and silver. The possession of this mineral wealth is not a source of unmixed benefit to the state, as the surrounding hills are so honeycombed with old mines, that the people are unable to keep cattle, grazing being impossible owing to these pitfalls. Coal of fair quantity is found in Pwehla, and copper and iron were both formerly mined for in the Myelat. From an ethnological point of view the country is most interesting. In the Myelat there are over twenty different tribes, distinct in dress, customs, and often language. These tribes do not, as a rule, intermarry. Although so different otherwise in character, they resemble one another closely in some points. They are unambitious and unenterprising, but cheerful and fond of amusement, and, although constitutionally lazy, take care to work sufficiently hard to keep themselves in comfort. The wife does all the housework, and a very large share of the outdoor work as well. So important a member of the household is she considered, that in most of the states a widower is exempt from all taxation. The Shan is a born trader, and the great feature of life in this country is the bazaar, which is held on every fifth day at all the chief villages of the states. There the gossip of the neighbourhood as well as its produce is exchanged, and for a few hours in the forenoon these markets present a scene of much animation. During the colder months an extensive trade is done between the Shan States and Burma, and the traders from the states east of the Salween, with their immense herds of fine pack-cattle, preceded by a favourite bull, carrying a deep-toned bell hung on a wooden arch on its shoulders, are continuously passing to and from the plains. The principal waterway is the Inle lake (Nyaungywe State), with its influents in the valley, as well as the Balu chaung, which flows out of the lake. The boats are navigated by an amphibious tribe, the Inthas, said to have been originally brought from the Tavoy province. They build their villages on piles in the lake, and construct floating gardens close by, where tomatoes, water-melons, and gourds grow in profusion. They are expert fishermen, and supply all the bazaars in the

neighbourhood with fish. Their method of rowing is peculiar; the boat man or woman—for both are equally expert—holds the end of the paddle in the hand, and propels it by the leg, which is hooked over the handle for the purpose. The country is generally fertile. Rice is the principal crop, but a little wheat, cotton, and sugar-cane is also grown, and in some parts good crops of earth-nuts are obtained; excellent oranges are grown in Pindaya and other favoured spots, and, judging from the size and appearance of the wild apple and peach trees, there should be no difficulty in cultivating these fruits as well. The country is thoroughly settled and peaceful, and the whole party moved freely throughout the district without escorts of any kind.

The above include some of the more interesting features of the field-work of the Department. At the headquarters' offices a vast amount of drawing, engraving, and other work incidental to publication was got through. Among the general maps issued during the year, were a map of Indo-China in 4 sheets on the 32-mile scale, and a military map of India and a map of the Bombay Presidency on the same scale. Of the new Calcutta Survey, 127 sheets on the 50-feet scale have been published during the year; the engraved plan on the 16-inches = 1-mile scale is not expected to be ready before the end of the present year. The heliogravure section was well employed with reproducing drawings of delicate Indian ink drawings of fishes, crustacea, and echinodermata to illustrate the zoology of the Royal Indian Marine Survey steamer *Investigator*, illustrations of coins for the Indian Museum, plates illustrative of the technical art series, and similar work. A view of Calcutta, taken from the tower of the Telegraphic Office by Mr. T. A. Pope, accompanies the Surveyor-General's Report, and, for microscopic clearness of outline and delicacy in gradation of shade, is as excellent a specimen of photographic reproduction as we remember to have seen.

THE FRANKLIN COMMEMORATION.

As Sunday, May 19, was the fiftieth anniversary of the departure from Greenhithe of the memorable Arctic expedition under the command of Sir John Franklin, the Council resolved to hold a special meeting on the 20th in commemoration of the event. In connection with this festival, some three hundred Fellows of the Society and their friends joined together to pay a visit to Greenwich for the purpose of inspecting the interesting collection of Franklin relics in the museum at Greenwich. The President and several of the Council took part in this visit, and on board were Sir Leopold M'Clintock and several other survivors of the Franklin search expeditions, as well as relatives of Franklin and his officers, and Commandant Le Clerc, as representative of the Paris Geographical Society. Two steamers were hired and left Westminster Pier

at 11 o'clock on the morning of the 20th. On arrival at Greenwich, the company was received by Admiral Sir W. J. Hunt-Grubbe, K.C.B., who took a great interest in the proceedings, and by Captain Durnford, R.N., D.S. The company spent about an hour in inspecting the large collection of Franklin relics and in visiting the painted hall where there are so many portraits of England's naval heroes. Mrs. Lefroy, a niece of Sir John Franklin, had placed a beautiful wreath of flowers round his portrait in the museum. On returning on board, the company was served with luncheon while the steamers went a little way down the river. On the return journey, the magnificent Tower Bridge was opened for the special benefit of the Franklin pilgrims. At Greenwich, Commandant Le Clerc reverently placed a wreath on the obelisk erected there to Lieutenant Bellot.

In the evening the Geographical Club gave a dinner to the survivors of the search expeditions. This dinner was honoured by the presence of H.R.H. the Duke of York, while the United States was represented by its ambassador. Among the survivors of the Franklin search expeditions the following were able to be present: Admiral Sir Leopold M'Clintock, Admiral Sir Erasmus Ommanney, Admiral Sir Vesey Hamilton, Admiral Sir George Nares, Sir Allen Young, Captain W. W. May, Captain Allen, Captain Jenkins, Captain W. A. Fawckner, Captain Hull, Captain Hills, Dr. Charles Ede, Dr. F. Y. Toms, and Mr. William Dean, besides the President himself, who served in the *Assistance* under Sir Erasmus Ommanney. Other Arctic officers present were Admiral A. H. Markham, Captain L. A. Beaumont, Captain Parr, Colonel Feilden, besides Mr. Leigh Smith and Dr. W. H. Neale. Among the others present were Viscount Midleton, Lord Kelvin, Lord George Hamilton, Sir William Farrer, Admiral Sir Edmund Commerell, Admiral Sir Anthony Hoskins, Admiral Sir F. W. Richards, Admiral Sir W. J. Hunt-Grubbe, General Sir Arnold Kemball, General Sir Francis de Winton, Sir George Baden Powell, General H. D. Crozier, Admiral Dale, Dr. John Murray, Dr. Gell, Mr. P. L. Gell, Mr. John Clark, Q.C., Captain W. E. Fairholme, Mr. A. C. Harmsworth, and Mr. A. Montefiore.

The President proposed the toast of the Arctic Survivors, which was briefly responded to by Admiral Sir Leopold M'Clintock.

At the large and brilliant meeting of the Society which followed all the dinner guests were present, besides Commandant Le Clerc, the naval attaché of the French Embassy, the state of whose health prevented him from attending the dinner, although he took part in the morning's excursion and was present at the evening meeting as the countryman of the brave but unfortunate Bellot, and as the representative of the Paris Geographical Society. There were also present many relatives of Franklin and his officers, and the several seamen who had served on board one or other of the search expeditions: Mr. Mumford (carpenter's mate, H.M.S. *Resolute*, 1852–54); Mr. Hester (captain's coxswain, H.M.S.

Enterprise); Mr. Smithers (stoker, *Intrepid*); Mr. Custance (stoker, *Intrepid*); Mr. Allen (stoker, *Pioneer*). Mr. Tullit (captain of the main-top in the *Assistance*, 1850–51) had accepted the invitation, but died on March 31.

In two of the large rooms adjoining the hall, kindly lent by the Senate of the University of London, was arranged an exhibition of great interest, consisting of portraits of Franklin and his officers, of the officers of the search expeditions, pictures of Arctic scenery by Captain W. W. May and others, photographs, maps, Sir Leopold M'Clintock's sledge, and various articles more or less connected with Franklin. While some of these belonged to the Society itself, others were kindly lent by Mr. John Barrow, Sir Leopold M'Clintock, Mr. Gorman, Captain May, and Mr. Markham. One of the most interesting objects was the silver model of the *Fox*, Sir Leopold M'Clintock's ship, presented to the admiral by Lady Franklin. These exhibits were inspected with evident interest by most of the audience at the close of the meeting. The following is a report of the addresses which were given at the meeting.

The PRESIDENT said—

We are assembled to commemorate the fiftieth anniversary of the departure of the Arctic Expedition, commanded by our Vice-President, Sir John Franklin, on May 20, 1845. It was a memorable event, for it was a turning-point in the history of polar discovery; and there are good reasons for not allowing such an anniversary to pass by without notice. A commemoration, such as that which we now celebrate, serves more than one useful purpose. It recalls the memory of brave men who did their duty well and nobly in their generation. It revives and freshens our knowledge of their work, and of what we owe to them for the examples they have set us, and for the credit their labours have secured for our country. It enforces on our minds the lessons to be derived from the past, in our efforts to work for the present and for the future. Above all, the renewal of an interest in former achievements has a tendency to incite among our younger associates a feeling of admiration, which is a direct incentive to emulation in the same glorious field of geographical research.

For these reasons we do well to look back, from time to time, and to consider the work of those who have gone before us; and now we fix our attention on those two famous old barque-rigged vessels as they got under weigh at Greenhithe, and proceeded down the Thames just fifty years ago. They were already historical. They alone had twice sailed through the south polar pack; their names are immortalized by Mounts Erebus and Terror, on the far Antarctic continent; and, in 1845, they were once more starting on a glorious enterprise, carrying hearts full of zeal, of enthusiasm, and of devotion to their country. But we must not forget those illustrious men whose constancy and perseverance had led

to the equipment of the expedition. Among them two stand pre-eminent, Sir John Barrow and Sir Francis Beaufort.

Sir John Barrow, one of the principal originators of this Society, was Secretary to the Admiralty for upwards of forty years. In that long period he was the unceasing promoter of geographical research in all parts of the world, but especially in Africa and in the Arctic Regions. To Sir John Barrow is due the renewal of polar research in 1818, and the despatch of the expeditions of Ross, Parry, and Franklin: whose perilous adventures and great discoveries excited such intense interest when our grandfathers were schoolboys. Then there was a pause; but when the Antarctic Expedition returned, Sir John Barrow once more advocated and secured that second renewal of north polar research in 1845 which we have now assembled to commemorate. He retired from the Admiralty in 1845, in his eighty-first year; and when his long and most valuable life was ended three years afterwards, he died full of hope in the success of his gallant friends in the far north. No one acquainted with Arctic history, in referring to all that geography owes to Sir John Barrow, can fail to remember what is due to his son. John Barrow, who is still amongst us, was the warmest friend that Arctic officers ever had, deeply sympathizing in their hopes and aspirations, and helping them in a thousand ways by his suggestions, his ever-ready assistance, and his kindly forethought. I am sure that every Arctic officer who recalls the memories of his own polar services, combines these memories with a warm feeling of affection for John Barrow.

Sir Francis Beaufort, who was another founder of this Society, served on our Council for upwards of a quarter of a century. He was the Hydrographer of the Admiralty for thirty years; where his influence and activity made itself felt for good. Seconded by an admirable staff of surveyors, he was able to despatch well-equipped surveying vessels in various directions; and our President, Sir Roderick Murchison, had no hesitation in affirming that the master mind of Beaufort, which directed such noble efforts during a quarter of a century, did more for the advancement of maritime geography than was effected in the same time by all the surveyors of other countries united. As a Councillor of this Society, Sir Francis Beaufort advised us to urge the Government to fulfil its duties to geographical science, and even accompanied our deputations with that object. As Hydrographer he zealously and ably seconded the efforts of Sir John Barrow, in advocating the renewal of polar research.

Sir John Franklin never slackened in his zeal for discovery while life lasted. From the day when he first beheld the seashore on an expedition from Spilsby, when a boy of twelve years old, to his death on the threshold of the North-West Passage he never swerved. No dangers could daunt him, no ill luck and no misfortune could turn him aside.

Few men had greater war services. Signal midshipman in Dance's famous action with Linois, he also served at Copenhagen, at Trafalgar, and at New Orleans. But his true work began with the survey of the Australian coasts under his relative Captain Flinders, and when, in 1818, Sir John Barrow opened the Arctic Regions as a new field of enterprise for the navy, Franklin was among the foremost of the volunteers. He commanded the *Trent* in the attempt to penetrate north of Spitzbergen in 1818, and in the following year he was entrusted with the command of the important expedition to penetrate by land to the shores of Arctic America. The story of this famous enterprise was read, with intense interest, by every schoolboy when I was one; and the zeal, energy, and endurance, under appalling circumstances of hardship and starvation, of Franklin and his companions created a profound sensation on his return. Major Rennell declared he had never heard of such trials before, or of such heroic fortitude in facing them. Franklin's second land expedition, during which he discovered over a thousand miles of the shores of Arctic America, still further increased his renown, and his name, coupled with that of Parry, became as a household word to that, and in but a slightly less degree, to succeeding generations of his countrymen. I know of no more pathetic incident than Franklin's parting from his young wife who was dying, but who urged him to place his duty to his country before his love for her. Both knew, when he sailed, that they had seen each other for the last time in this world. Franklin's dying wife had worked him a silken Union Jack, which was first unfurled when they reached the polar sea. "You can imagine," he wrote home, "it was with heartfelt emotion I first saw the Union Jack, but in a short time I derived great pleasure from looking at it."

In these two famous expeditions Sir John Franklin showed himself to be a true leader of men, resolute, firm, indifferent to hardships and dangers, but full of care and forethought for those who served under him. During his commission in the Mediterranean on board the *Rainbow*, other qualities were brought into play; and Sir John is still remembered at Patras as the saviour of that town from pillage, on more than one occasion; while his ship was a welcome refuge for fugitives, and a centre of kindly hospitality. The commander-in-chief in the Mediterranean, Sir Henry Hotham, commended Franklin's judgment and forbearance, and his calm and steady conduct under very trying and difficult circumstances. We next find him, as Governor of Tasmania, showing his ability as an administrator. Under his wise and judicious rule the debt of the colony was paid off, deficits were replaced by a surplus, a collegiate institution and a scientific society were founded, and a magnetic observatory was established; while the governor exerted himself to the utmost in assisting his friend, Sir James Ross, to perform his arduous duties connected with Antarctic exploration.

In those days Sir John Franklin enjoyed the helpful co-operation of his second wife, a devoted lady, whose high qualities were more fully brought into play when her noble exertions in the cause of the lost expedition aroused the admiration of the whole civilized world.

Sir John Franklin returned from Tasmania in 1844, to find that Sir John Barrow and Sir Francis Beaufort were on the eve of success, and that polar research was about to be renewed. He at once volunteered for the command of the expedition; and it was generally felt that the right choice had been made when the appointment was announced. This was undoubtedly the feeling in the navy, and among men of science, and, above all, among the Fellows of this Society. Sir John Franklin was one of the first to join our dining club. He was an original member of our Society, and on its first Council. He always took a deep interest in our proceedings, and he was actually one of our Vice-Presidents when he sailed from England. Volunteers literally poured in, especially from the *Excellent*, and the officers selected were among the most promising and rising men in the service. Captain Crozier, the second in command, had been three voyages with Sir Edward Parry, and had commanded the *Terror* in Ross's Antarctic Expedition—a well-tried man in the ice and an excellent observer. Fitzjames, the commander of the *Erebus*, who was a Fellow of this Society, was the life and soul of the expedition. He was among the most promising officers in the navy. He had served in the operations on the coast of Syria, and in the first China war, where his brilliant conduct was such that he was five times gazetted. He was in all the operations of the Yangtse Kiang, and received four bullet-wounds at the storming of Ching-kiang-fu—one through the body, which was extracted beneath his shoulder-blade. Fitzjames was the very *beau ideal* of an Arctic officer. Full of zeal and energy, well-informed, and endowed with a spirit of enterprise which had already been displayed in his service with the Euphrates expedition, he was also prudent and judicious. He was kind hearted and unselfish, and full of mirthful humour, which tended to keep every one cheerful around him. His powers as a humorous writer were shown in his 'Voyage of the *Cornwallis*,' a most amusing rhyming narrative of the war in China in nine cantos. Fitzjames was gifted with an intuitive insight into character, which enabled him to make allowances for the shortcomings and to appreciate the good qualities of his messmates.

It has been said that Franklin was too old for the work. No one could be so good a judge as his commander, and the opinion of Fitzjames is decisive on this point. Writing from Greenland he said, "Sir John is delightful, active, and energetic, and evidently even now persevering. What he has been we all know; and I think it will turn out that he is in no ways altered. I would not lose him for the command of the expedition, for I have a real regard—I might say affection—for

him, and I believe this is felt by all of us. He has good judgment and a capital memory, his conversation being delightful and most instructive. Of all men he is the most fitted for the command of an enterprise, requiring sound sense and great perseverance."

The rest of the officers are made known to us by a few masterly and kindly touches from the pen of Fitzjames. "In our mess we are very happy," he wrote. "We have a most agreeable set of men, and I could suggest no change." He tells us of Graham Gore, who made the acquaintance of the ice during the perilous voyage of the *Terror* in 1836, and had since done good service in the China war, "a man of great stability of character, a very good officer, the sweetest of tempers, and altogether a capital fellow." Le Vesconte, who won his lieutenancy by repeated acts of conspicuous gallantry in the China war, was Fitzjames's first-lieutenant in the *Clio*. He describes Fairholme, of the Niger Expedition, as "a most agreeable companion, and well-informed man." Des Vœux, who had been naval aide-de-camp to Lord Gough, "a clever, light-hearted, obliging young fellow." Sargent, "a nice pleasant lad and very good-natured." Couch, the youngest in the mess, "a little black-haired, smooth-faced fellow, good-humoured in his own way, writes, draws, works, all quietly." Collins, the second master, was, he wrote, "the very essence of good-humour and good-nature." Then he gives us pictures of old Mr. Osmer, the purser—"merry-hearted as any young man, full of quaint, dry sayings, always laughing, always good-humoured, never a bore"—of Stanley, the able and accomplished surgeon; and of Goodsir, the naturalist. In the other ship, with such men as Irving, who had experience of rough life in Australia, and had made preparations for amusing the men in the winter; Hodgson, an officer of the highest character, and one of the leading lieutenants in the *Excellent*, with young Hornby and Thomas, the same story of a happy and united mess could have been told.

With such officers, and two gallant crews, led by our illustrious Vice-President, a large measure of success was almost certain. The scientific work was commenced at once, and it is a great satisfaction that it was not all lost. On June 28 a dredge was sunk to the enormous depth of 300 fathoms, and produced many highly interesting specimens. These were by far the deepest dredgings ever obtained up to that time, except by the Rosses, and the results, which were sent home from Greenland by Dr. Goodsir, the naturalist, were of considerable scientific value. Proceeding onwards, the instructions were to work southward from Cape Walker towards the coast of America, but an alternative route was suggested by the Wellington Channel leading north from Barrow Strait. We know what Sir John's opinion was, from one of Fitzjames's letters. "At dinner to-day," he wrote, "Sir John gave us a pleasant account of his expectations of being able to get through the ice on the coast of America, and his disbelief in the idea that there is

open sea to the northward." But in all probability, when the *Erebus* and *Terror* sailed up Barrow Strait, the Wellington Channel was found to be exceptionally open, and Sir John was persuaded by his officers to try that route, for we know that Fitzjames had a leaning in favour of a way north about. One of the most remarkable voyages ever made in the Arctic Regions was the result. Franklin sailed up Wellington Channel for 150 miles, reaching 77°, and re-entered Barrow Strait by a channel which he discovered between Bathurst and Cornwallis Islands, returning to winter at Beechey Island. "Seldom," says Sir Leopold M'Clintock, "has such an amount of success been accorded to an Arctic navigator in a single season, and the results of the first year's labour must have been most cheering."

During the first winter Franklin matured his own plan of trying to force a way, by Cape Walker, to the coast of Arctic America, which he knew well, and where open water would enable him to complete the passage to Bering Strait. The absence of any document on Beechey Island points to the conclusion that the ships were blown out of the harbour by a gale, and very suddenly. Franklin then proceeded to the south, between Capes Bunny and Walker, for 250 miles down the channel which is now known by his name. The ships were beset on September 12, near the coast of King William Land, but they were now close to their goal, and they wintered in the full expectation of achieving the grand object of the enterprise in the next season. In their two first navigable seasons no expedition had ever done so well. In the spring of 1847 Graham Gore and Des Vœux, with a sledge party, landed on King William Land, probably to connect Cape Victory with Cape Herschel, by doing which the north-west passage was discovered. On June 11, Sir John Franklin died in the justifiable hope that the ships would be able to complete their great work in that season. He must have taken his last farewell of his beloved companions, happy in the full expectation of their success, and in the consciousness of having done his best. Thus ended a noble life passed in the zealous performance of duty. Sir John died in the midst of his discoveries. There could be no happier, no more successful, no more glorious end.

Sir John Franklin's attempt was admirably conceived, ably and resolutely conducted, and was within measurable distance of success. His deductions were correct, based on the then existing knowledge. He knew that if he could reach the coast of the continent, he would find open water to take him to Bering Strait. He steered south, and succeeded in navigating a long and usually ice-encumbered channel—an achievement calling for no small amount of skill and good seamanship. It has never been done since. But his chart told him that King William Land was connected with Boothia. Had he known that it was an island, and that there was a channel to the eastward, he might have passed on. As it was, there were physical causes, then

unknown, which made the passage by a western channel impossible; 80 miles more would have done it, but the door, by that route, is for ever closed by ice. For this is the point where the Atlantic and Pacific tides meet. The heavy ice, pouring down M'Clintock Channel, impinges on this coast of King William Island, and can never be cleared away. A long series of tidal observations in numerous positions enabled Mr. Houghton to establish this fact long afterwards. But it was unknown to Franklin and his officers; and when a third winter became inevitable, the outlook was very serious. We know that Crozier and Fitzjames made most careful preparations for a retreat during that anxious third winter, especially in fitting and adapting the boats for an ascent of the Back River. We know that they landed the surviving officers and men in April, 1848; and we know that they commenced a hopeless retreat. In the beautiful words of my dear old friend Sherard Osborn, who was also the friend of Irving, Fairholme, Hodgson, and Des Vœux, among those lost ones, "They pass from sight into the snowstorm which the warm south wind kindly sends to shroud the worn-out ones, who gently lie down to die; and they died so peacefully, so calmly, with the mind sweetly wandering back to the homes and friends of their childhood, the long-remembered prayer upon their lips, and their last fleeting thoughts of some long-treasured love for one they would one day meet in heaven." This is surely enough. Let us not "attempt to lift the veil with which the All-merciful has been pleased to shut out from mortal ken the last sad hours of brave men."

For long before this, the battle had been fought and the victory won. Every Arctic Expedition is a success if it crosses the threshold of what was previously unknown. This is the proper test; and, when tried by it, the Franklin Expedition was a most remarkable success. The voyage up Wellington Channel to 77° N. and back is a wonderful and unequalled feat. The voyage down Franklin Channel is a still more striking achievement. The discovery of the North-West Passage was a glorious crown to hard work well and nobly done.

There are many who can remember the deep anxiety of the whole nation, turned into mourning mingled with admiration, when M'Clintock brought back the last sad news. But we no longer mourn for our Vice-President and for our associate Fitzjames. The navy no longer mourns for its gallant officers and men. The nation no longer mourns for those who died so bravely in her service. Another feeling has taken the place of that sorrow which prevailed when the wounds were fresh. Franklin and his companions are among the *Dii Majores* of geographers and of sailors. They are the examples which we hold up for imitation; their deeds incite successive generations to go forth and to do likewise. And their expedition forms a turning-point in the history of exploration. These, indeed, are the reasons for our commemoration; and they are strong reasons.

For of what has the departure from Greenhithe on that third Monday of May, 1845, been the precursor? It not only commenced the work of Franklin and his companions, but, through that work, it was also the precursor of all that followed. The nation was deeply moved when the *Erebus* and *Terror* did not return. Then came the search expeditions, which were continued, in various directions, for the next ten years. Relief and succour, if not too late, was our aspiration; if too late, then the sacred duty of saving the deeds of our countrymen from oblivion. A woman's devoted love, and a generous nation's sympathy, enabled this to be done—"enabled the searchers," in Osborn's words, "to weave together the story of a glorious achievement, and to secure to Franklin and his followers the honour for which they died." Incidentally, however, the Arctic search expeditions did much more than this. They developed the system of sledge-travelling, which has since done so much for geographical discovery. They explored thousands of miles of previously unknown country, increasing materially the sum of human knowledge.

These expeditions also furnished an admirable training for many officers and men, most of whom did good work afterwards in the regular service. Thirty-three gallant officers who went out to search for Franklin and his companions happily survive out of the 145. We have the pleasure of welcoming fourteen * of them here to-night, to celebrate the fiftieth anniversary of the departure of those for whose sakes they went through such perils and hardships in the frozen north. I rejoice also that to-night we welcome the presence of four or five of the survivors among the men who served in the search expeditions.† "On them fell the hardest work," wrote Sherard Osborn, "to the officers fell the honours," although they also were ever zealous, ever ready for any work that came to their hands to do, "yet none excelled the men in pluck and in sanguine hopefulness for success. They had their moments of pleasure too while away sledging, and plenty of them, in spite of cold, in spite of fatigue. There was honest congratulation after a good day's work; there was the time after the pemmican had been eaten and each man, drawing up his blanket bag around his chin, sat, pannikin in hand, and received from the cook the half-gill of grog. After drinking it, there was sometimes an hour's chat, during which there was more hearty merriment, I trow, than in many a palace, dry witticisms or caustic remarks that made one's sides ache with laughter."

* Admiral Sir E. Ommanney, C.B., Admiral Sir Leopold M'Clintock, K.C.B., Admiral Sir George Nares, K.C.B., Sir Allen Young, C.B., Sir R. Vesey Hamilton, G.C.B., Captain Allen, C.B., Captain May, Commanders Hull and Jenkins, Captains Hills and Fawckner, Mr. Dean, Drs. Ede and Toms.

† Tulitt (Captain M. T.), *Assistance*, 1850–51, accepted the invitation, but died last March; Hester (Captain Cox.), *Enterprise*, 1850–54; Bidgood (dog-driver), *Resolute*, 1852-54; Mumford (carpenter's mate), *Resolute*, 1852–54; Smithers (stoker), *Intrepid*, 1852-54; Custance (stoker), *Intrepid*, 1850–51; Allen (stoker), *Pioneer*, 1852–54.

They could play, but, by Jove, they could work, impelled as they were by the earnest hope of finding and relieving the lost ones. All honour to the Arctic officers, and all honour to the men.

And let us not forget our generous friends who came forward to help us in the hour of need. Let us remember the sympathy of the French nation, and how France sent two of her officers, Lieutenant Bellot and Lieutenant de Bray, to aid in the search for our missing countrymen. Bellot's untimely death formed a tie of sympathy between the two countries, which is commemorated by the obelisk at Greenwich, erected by Sir Roderick Murchison and the Fellows of this Society. Some of us visited the Bellot monument this afternoon, when Captain Le Clerc, who is deputed to represent the Paris Geographical Society, deposited a wreath on it.

Let us remember, too, the munificent generosity of Mr. Grinnell, and the cordial sympathy of the United States, and how the *Advance* and *Rescue* were despatched to aid in the search. Brave and true-hearted men were the leaders of those tiny vessels, and well was their story told by my old friend Elisha Kent Kane. Several now present will remember the brief but pleasant exchanges of visits between American and English searchers alongside the fast ice of Griffith Island, in September, 1850. Both to the French nation and to the American nation our warmest acknowledgments are for ever due, for their generosity and their sympathy in the days of the Franklin search.

Those Arctic search expeditions had another permanent effect. They aroused the emulation of other countries, thus ensuring a continuance of that work which was commenced when the *Erebus* and *Terror* sailed from Greenhithe. In the years following the conclusion of the search work Americans, Germans, Austrians, Swedes, and Dutch were in the field, doing good service for geography.

Meanwhile the enthusiasm for polar research was maintained in this Society, and throughout the country by its staunch friend Sir Roderick Murchison, while Sherard Osborn, with that determination to win which characterized him, went on pegging away until our Government resolved to send another Arctic Expedition. The meeting of this Society at which my old messmate Sherard Osborn opened the campaign, on January 23, 1865, was one of the most crowded and the most enthusiastic I ever attended. "We are no more prepared to turn our backs upon the Arctic Regions because Sir John Franklin died off King William Island," he declared, "than to do so to an enemy's fleet because Nelson fell at Trafalgar." Murchison and Osborn were warmly seconded in their efforts by that noble and patriotic woman, our Gold Medallist Lady Franklin. So another naval Arctic Expedition left our shores in 1875, planted the Union Jack in 83° 20′ N., and brought back a rich harvest of results in all branches of science. Since the return of Sir George Nares the feeling in favour of completing the exploration

of the polar regions, north and south, seems to me to have received a fresh impetus, and scarcely a year has passed without some good Arctic work being done.

At this moment there are at least three expeditions at work within the polar circle, Peary in northern Greenland, Nansen crossing the pole, and our countryman Jackson exploring Franz Josef Land. But we are now looking with greatest hope to the southern polar region, where the extent of unknown land is largest, and the scientific results most important. Antarctic work brings back to us fresh memories of those whose achievements we are now assembled to commemorate. It is more than fifty years since the last Antarctic Expedition returned, and then Sir John Franklin, as Governor of Tasmania, was doing his utmost to assist its gallant leader, Sir James Ross, while Crozier of the *Terror* was second in command. Such memories incite us to fresh and renewed efforts in advocating the great cause to which England mainly owes her high position among the nations, the cause of maritime enterprise and discovery. For to look back on the past strengthens and invigorates us in our labours for the present and for the future. We look back then at Greenhithe, and at those two brave ships moving down the river just half a century ago, as the starting-point whence we trace a continuous stream of high-souled effort, and of magnificent results, down to this present day, when we strive to make an Antarctic Expedition, or at least a renewed effort to obtain its despatch, the chief and the most practical outcome of our Franklin Commemoration to-night.

Admiral Sir Leopold M'Clintock: Our President has very kindly invited me to say a few words. I am glad to do so; but I feel that I *must* preface them with what is uppermost in my thoughts. I therefore take the liberty of offering him my most hearty congratulations on the able and eloquent address which he has just delivered. I also wish to say how deeply I sympathize with one sentiment he has uttered; which is, that we should remember the labours of the men as well as of the officers. I beg to emphasize that sentiment; it is never absent from my mind. My success in Arctic service is mainly due to the willing work of the fine fellows I have had the honour to command. I gladly avail myself of so appropriate an opportunity to mention *one or two conclusions* which my long searching experience has led up to. In order to do so accurately, I have put my ideas on paper.

It fell to my lot, in the month of May, 1859, to trace the footsteps of Franklin's retreating crews along a most inhospitable shore, for about 150 miles. In this most anxious duty I was very ably assisted by Lieutenant Hobson, who led a separate search-party from the *Fox*, and who twice sledged over most of this same ground. Having very closely examined the numerous traces left there by the lost crews, I was, of course, most deeply impressed. Let me remind you that the effect of extreme cold is to arrest decay, insomuch that all the relics, which had lain there for eleven years when I saw them, seemed as if they had only been exposed for so many months. The impression I then received, and which I still retain, was that the most careful and most anxious consideration had been given to the preparations for that terrible retreat towards the Hudson Bay Territories. Its nature was clearly understood by its leaders.

On landing from their ships on April 24 or 25, 1848, everything which was not

absolutely necessary for the contemplated journey was thrown away; only boats on sledges, food, clothing, and three or four guns were retained. The route adopted was the shortest possible; there was no straggling away from it. Evidently they all worked together, the strong helping the weak. It was plain that able leaders had faithful followers, and that the most perfect order prevailed. But the task was far too great for men already exhausted by three years of hardship and much privation; both their strength and their supplies failed, and at *that season* the snow-covered land afforded no sustenance whatever. To the last moment of their lives this heroic band of Christian men proved themselves worthy of the land which gave them birth, of the noble profession in which they had been trained, and of the past fame of their veteran leader—a gallant war officer and a Godfearing seaman, as were so many of our renowned Arctic worthies. *Once*, we are told by the Esquimaux, they came across a few natives, and encamped close to them; but the natives, seeing that the white men were almost destitute, feared to remain, and went away. They *need not* have feared, for those starving white men were under discipline. We have strong proof of this in the fact that the natives were not despoiled of their food, nor molested by them in any way whatever.

In laying down their lives at the call of duty, our countrymen bequeathed to us a rich gift—another of those noble examples not *very rare* in our history, and of which we are all so justly proud, one more beacon light to guide our sons to deeds of heroism in the future. These examples of unflinching courage, devotion to duty, and endurance of hardship, are as life-blood to naval enterprise.

The natural sequel came, namely, the long-continued "Franklin search," persistently followed up to its completion. Being one of the searchers, I must not allude to it further than to say that it will serve the purpose of showing to future generations that England never abandons those whom she sends forth in her service.

Still, it was hoped that some further records or documents of the lost expedition might yet be found buried under some cairn. With this hope strong in his mind, Lieutenant Frederick Schwatka, U.S.A., explored King William Island in 1879. He carried out an exhaustive search during the summer months, when the ground was entirely free from snow; he found numerous relics still strewed about; but during the twenty years which had elapsed since my visit in 1859, the Esquimaux had been over the ground, had carried away whatever was useful to them, had pulled down the cairns, and had even opened the graves. We must all feel the greatest regret that Lieutenant Schwatka's exhaustive search was unrewarded beyond the finding of four despoiled graves, and portions of six skeletons. His researches were, however, very valuable for the many interesting details which they supplied in confirmation of previous statements, and for dispelling many illusory reports at one time in circulation. The various interesting conversations held between him and the Esquimaux are given at some length in the published account of his unique journey.

And here I feel bound to remark that the generous and sympathetic help of our American kinsmen, throughout the whole period of the Franklin search, marked the beginning of that drawing together of the two great Anglo-Saxon nations, which is so striking a feature of the present day, and of which our children may reap the full fruition.

The PRESIDENT: I have just received a telegram from the survivors of the Arctic and Antarctic Expeditions residing at Chatham, expressing their cordial sympathy with the objects of to-night's meeting, sent by John Parry, Royal Marines, of Sir James Ross's ship *Erebus*.* I will now ask the American Ambassador whether he will be so kind as to address the meeting.

* A letter was also received from eleven resident pensioners in Sir John Hawkins's Hospital for old seamen in the Royal Navy, Chatham, offering hearty congratulations and good wishes.

Hon. THOMAS F. BAYARD: It is quite impossible, upon such an occasion as this, that the voice of my country should be inarticulate in the presence of the partakers in the glory of advancing geographical exploration, as I have heard the men themselves in the voices of your President and of Sir Leopold M'Clintock. I wish that some of my own countrymen who have assisted in the great work could be here in visible presence to speak words of fellowship and sympathy. I must, for want of better, say one word for them. This map and the wonderful thoughts it generates appeal to our feeling and our imagination. It seems—I can scarcely call it ghosts—but it seems to be the realities of those who have done so much to make that map full of meaning to us. If there shall stand the names of Franklin, of Ross, of M'Clintock and of Austin, and a great list of their peers and associates, —if they shall be found keeping guard over the secrets of nature in that remote region, they will not be found alone; the names of Grinnell, and of Hayes, and of Kane, and of Peary, and of Holland and Melville and Hall, will be found with them. If the noble *ardor Britannicus* shall plant your banner at the North Pole, it will not be solitary, for the *animus Americanus* will be there also. Go where you will, my kindred people, you will not be without the hearts and souls of Americans to accompany you in the noble endeavour to advance knowledge of the world we live in.

The PRESIDENT: Captain le Clerc has been deputed to come to this meeting to represent the French Geographical Society, and express its sympathy.

Captain LE CLERC: It is a great honour for me to have to answer for the Society of Geography of Paris. It is very kind of the President to have associated the name of Bellot in such a touching manner with the name of the glorious and venerated Sir John Franklin which is to-day commemorated. It is a great honour that his countrymen will certainly feel. England is a country which is second to none for hospitality; but there are two kinds—the material and the moral hospitality. The material hospitality, we all know how England is celebrated for that; the moral hospitality, which is the most precious one, England never grudges it to anybody who may work for science, civilization, and over all to those who plough the main to snatch from it the mysteries of nature. This last hospitality England has bestowed on Bellot's name and memory in a manner which I have most keenly felt to-day as a Frenchman and an officer in the French navy—I allude to the monument on the banks of the Thames, which has been erected by English care near the relics of Sir John Franklin. I think every countryman of mine should feel proud that the ships going up and down the Thames every day, when they ask, "What is this monument?" are answered, "It has been erected to a French officer—to Lieut. Bellot, by England." In him England wished to honour those qualities which are so dear to her, and of which you may have a just idea if you have read the admirable letters he wrote to the noble lady, the companion of Sir John Franklin. Also did England wish to honour one of our officers, who I won't say devoted his life to England, but devoted it to an enterprise which emanated from England on behalf of one of her sons who perished for the interests of human kind.

Admiral Sir EDMUND COMMERELL: I am called upon by the President, as a pure outsider, to give you a little bit of opinion on Arctic Expeditions, because I have never been there, though I have been very near there. I volunteered to go with Sir John Franklin in 1845. Lieutenant le Visconte, whom I was serving with at that time, and Captain Fitzjames, whom I served with in a ship previously, did the best they could with Sir John to give me a chance of going; but, ladies and gentlemen, I am happy to tell you that I was too young at that time. My experience of over fifty years in the service has taught me that you can look nowhere for better officers, in the ordinary run of duty, and better seamen, than in these Arctic Expeditions. We know very well that it has been an excellent

school in every way: an excellent school in hardihood, I may say almost of life, because I believe men who serve for two or three years, and survive an Arctic Expedition, are pretty certain to live, according to the survival of the fittest. I had for my coxswain a man who is alive now, and I am very sorry to see he is not here to-night. This is a man called Palmer, who was coxswain with Captain Markham on the Nares' expedition, and I believe he went further towards the North Pole almost than Captain Markham; and I know this much, that that man was as hard as nails. I thought myself I was pretty tough, certainly I was a few years older, but when we had been on the water together for three hours he beat me into fits. Well now, gentlemen, there are one or two celebrated officers whose names we must not forget, because they have not been forgotten by the President —one Sherard Osborn. I had the honour of serving with that noble man for a long time in the Crimea: a more able, energetic, earnest, gallant man I never came across in all my life; he was always forward in Arctic Expeditions, and untiring; so when it came to war, there was Sherard Osborn in the forefront. We remember him afterwards in China, as a leader of an expedition which was to do great good for China, and if he had been left to himself, I have no doubt it would have done great good; but unfortunately China did in those days what she has done now—when they have good men, instead of using them, they put them on one side to make way for their own very foolish leaders. Now, having made these remarks, and as it is getting late, I will say this: I believe in the future that neither Arctic nor Antarctic work will cease, as I am perfectly certain it is the best school we have for our navy.

Dr. Toms, R.N.: I was the last man who saw Bellot alive. I accompanied him when he got on the iceberg that overturned and lost him his life. I was a messmate of Sherard Osborn for more than two years, and I maintain what the last speaker said—that he was the bravest and most courageous man in the service.

The President: As it is getting late, I think we must wind up this very interesting discussion. We have to thank the American Ambassador and the representative of the French Geographical Society for the kind words of sympathy they have spoken to us. We have great pleasure in welcoming here to-night both old and young.* As I said before, we have with us representatives of officers and ships' companies of the search expeditions; we have several relations of Sir John Franklin, and of his officers; we have other explorers who have been in the north; we have many officers who took a deep interest in the work being done during the search for Franklin; we have young officers from Greenwich; and I am happy to say we have six young cadets from the *Worcester*, who, I hope, will distinguish themselves in years to come. I feel sure that this celebration of the sailing of Sir John Franklin, this commemoration of his work, will not soon be forgotten by those who have taken part in it. Our knowledge has been improved and refreshed by a renewed study of former achievements, and we have contemplated the noble work done by our predecessors through devotion to duty, through desire to do well, and determination to succeed. All these are lessons which have been taught to us by this commemoration, and I trust, therefore, that it has been not only interesting, but also that it has served for our edification in many ways. We have to thank H.R.H. the Duke of York for his kindness in coming: he naturally takes a deep interest in the work of naval officers and also of the men of the navy. I hope that you will now adjourn to the other room, and examine the portraits of our Arctic officers collected there, and many relics of the Franklin and other expeditions.

* Mr. John Franklin Wiseman, the eldest great-grandson of Sir John Franklin, wrote to the President to express his warm sympathy with the feelings which led to the commemoration, and his regret that his engagements at Clifton College prevented him from being present.

BATHYMETRICAL SURVEY OF THE ENGLISH LAKES.*

By HUGH ROBERT MILL, D.Sc., F.R.S.E.

With the support of the Royal Geographical Society, and the approval and assistance of the Ordnance Survey, I have been able to construct the accompanying maps of the beds of the largest English lakes. The following paper explains the object, methods, and results of the work.

From the standpoint of the physical geographer, the mapping of the surface of the Earth should refer to the forms of the solid crust, disregarding the fluid envelopes, the aqueous as well as the aërial. At an early stage of exploration, the distinction between land and water is necessarily the fundamental contrast: land is represented on maps with its valley-lines defined by streams, and its mountain masses sketched in from general observations; water remains a blank. But when scientific surveying reaches such a high level of efficiency as it now does in this country, it is neither rational nor right that the best maps should show the minutest detail on land, and only meaningless lines on the water.

The Hydrographic Office of the Admiralty is charged with the preparation of charts showing the configuration of the sea-bed, not only along the coasts of the British Islands, but in every part of the ocean to which the British flag is carried. This work is unexcelled for accuracy, but it is practically bounded by the dividing-line between salt water and fresh. Only in the case of Loch Ness, Loch Lochy, and the other lakes joined by the Caledonian canal, of Loch Lomond, and of Loch Awe, exceptions have been made, but the other large navigable inland lakes of Britain have never been officially charted. Steamers ply regularly on Loch Tay, Loch Katrine, Loch Eck, Windermere, Ullswater, and Coniston, but their skippers have only the vaguest notions of the depths over which they float. Contour-lines deduced from the soundings which form the basis of this paper are now, however, being placed upon the Ordnance maps, and they will help to complete the scientific delineation of the country.

Official surveyors have mapped the lakes of France and Switzerland by means of the most elaborate and accurate soundings ever made; indeed, there are few, if any, parts of the Earth's surface every inequality of which is so minutely known as the beds of the lakes of Geneva and Constance. In Austria and Germany, the researches of individual scientific men have sufficed to allow the lakes to be mapped with some approach to accuracy. In America many lakes have been mapped by the Geological Surveys. Several of the fresh-water lakes of Scotland

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* Paper read at the Meeting of the Royal Geographical Society, on June 18, 1894. Revised in May, 1895. Maps, p. 108.

have been surveyed by private enterprise, or by the officers of the Geological Survey.

I. Configuration of District.

This paper is confined to the consideration of the group of lakes which occur in the mountainous region of north-western England, occupied by the counties of Lancashire, Westmorland, and Cumberland. The region is one of very distinct physical individuality, and is familiarly known as the Lake District. The sea borders it on the west, the flat shores of Morecambe bay and the Solway Firth shut it in to south and north, and the valleys of the Eden and the Lune interpose a trench between its mountainous border on the east and the Pennine range. Geologically, also, the Lake District is distinct from its surroundings, being composed centrally of highly complicated volcanic rocks—lavas and bedded ash, the latter often altered into slate—while the coal-measures and new red sandstone form irregular outer rings on the lower ground. The orography of the district, as represented in the general map No. I. (where the limits of the drainage area of each lake are shown), may be looked upon as carved out of a great dome, cleft from north to south through the centre by two long depressions. The highest point in the eastern depression—Dunmail Raise—is only 800 feet above the sea. This cleft contains Thirlmere, Grasmere, Rydal Water, and Windermere. The western is crossed by a narrow ridge —that of Stake Pass, 1500 feet high—and it contains Derwentwater, the extinct lakes of Borrowdale and Langdale, and Coniston Water. The central mass between the two depressions contains the heights of the Langdale Pikes and Sergeant Man. The eastern mass contains the summits of Helvellyn (3118 feet), Fairfield, Red Screes, and High Street, and long valleys radiate from it to north-east and south-east. Two of these valleys contain lakes, Ullswater and Hawes-water. The western mass is more deeply cut by valleys, forming groups of heights dominated by Coniston Old Man, Scafell Pike (3210 feet), Scafell (3162), Great Gable, the Pillar and Steeple, High Stile, and Grasmoor. Valleys run in all directions radially, north, north-west, west, south-west, and south from this mass, and these radiating valleys contain Buttermere and Crummock Water, Ennerdale Water, Wast-water, Coniston Water. The valleys are more numerous and picturesque than those on the east, as might be expected from their position facing the prevailing sea-winds. The isolated group of Skiddaw (3054 feet) rises from the low ground north of the mouth of the double central depression, and gives form to its lower end.

The simple symmetry of the mountain and valley system of the Lake District bears little or no relation to the present geological structure. Thirlmere is partly outlined by a fault, and Ullswater lies in part on a tongue of softer rock between two harder masses; but for the rest, the

drainage-lines cross the geological boundaries at all angles, with no perceptible change. They bear testimony to an earlier and simpler structure, when a dome of vanished rocks spread over the area, the dissected skeleton of which, worn by the warfare of air and rain and ice, now alone remains. That the radiate symmetry of the Lake District is too distinct to be accidental will appear from Fig. 1, on which concentric circles of increasing radius are described from what was possibly

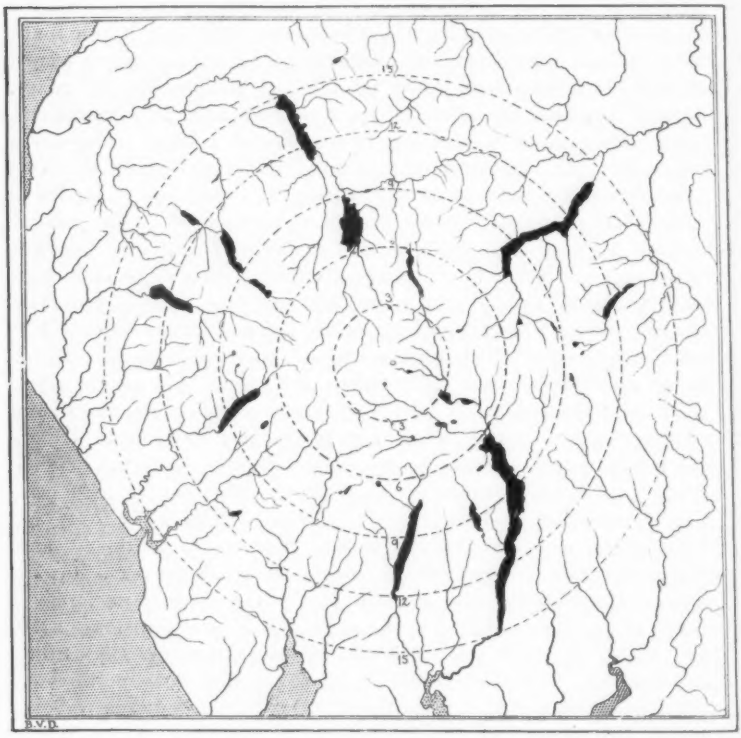

FIG. 1.—THE RADIATE SYMMETRY OF THE LAKE DISTRICT, SHOWN BY THE STREAM-LINES.

the crown of the ancient dome, and is now the middle of the small central mountain mass lying between the Thirlmere-Windermere and the Langstrath-Borrowdale depressions. The exact centre chosen for this purpose is the point midway between Stake Pass and Dunmail Raise, lying on the western slope of High Raise. A circle of 3 miles' radius from this centre touches the head of Grasmere on the southern drainage, and very nearly reaches the head of Thirlmere on the northern. A circle of 6 miles' radius may be taken as the commencement of the

radiating lake-system. It touches the head of Windermere on the south, and of Derwentwater on the north, and comes within 1½ mile of the head of Coniston on the south, Ullswater on the north-east, and Wastwater and Buttermere on the west, reaching the valley flats over which these lakes formerly extended. It touches the outlet of Thirlmere. A radius of 9 miles passes a little to the south of the deepest part of Windermere on the south-east, cuts the deepest part of Ullswater on the north-east, the northern end of Derwentwater in the north-north-west, passes through the upper end of Crummock Water on the north-west, a little south of the deepest part of Wastwater on the west-south-west, a little north of the deepest part of Coniston on the south, and through the centre of Esthwaite. This circle may be termed the central line of the Lake District, passing, as it does, through or near the deepest part of the four deepest, and across the alluvial flats which separate the upper and lower members of the two lakes which were once single, but are now divided. A circle of 12 miles' radius from the same centre cuts the lower ends of Coniston Water, Windermere, the middle of Haweswater, and the lower end of Ullswater, the upper end of Bassenthwaite, and the middle of Ennerdale. Finally, a circle of 15 miles' radius just touches the outlets of Bassenthwaite in the north-north-west, and of Windermere on the south-south-east, and it includes every lake and tarn of the Lake District (except the little Over Water on the north slopes of the Skiddaw elevation), and almost all the land of greater altitude than 1000 feet.

Between the nine great radiating valleys, the beds of which are hollowed into lake-basins, there are several important valleys in which lakes do not now occur, but the streams flowing down these often traverse long stretches of flat meadow-land bearing undoubted marks of the existence of lakes at an earlier time. Four may be mentioned—those of the Esk and Duddon on the south-west, between Wastwater and Coniston; Great Langdale, in line with the upper reach of Windermere; and Long Sleddale on the south-west, between Windermere and Haweswater. Thus the Lake District is a symmetrical result of land-shaping agencies which have evidently acted in lines directed outwards in all directions from the centre indicated, in such a way that the valleys now represent spokes of an irregular wheel; and each valley is associated with one or more lakes, actual or extinct. There are two instances of valleys dipping inward toward the centre of the district—Lowes Water on the north-west, draining to Crummock Water; and the Glenderamackin Beck, from the slopes of Saddleback in the north-east. These suggest a slight raising of the rim of the wheel of lakes, and such a raising of the rim all round the 15-mile circle would, according to one geological theory, account for the formation of the lakes by the elevation of the lower ends of earlier erosion valleys. Another theory of the origin of the lake-basins is that they were hollowed in the floors of the valleys

by the abrasion of the ice-cap which formerly overrode the district, flowing outward from the orographical centre, and of the glaciers which marked its gradual disappearance. My object in this work has been purely geographical, and reference is made to geological theory merely to suggest one interesting direction in which the results of the geographical investigation may be applied by specialists, not in order to bring forward here any controversies belonging to the sister science.

Since writing this section I have seen the old 'Guide-Book to the Lake District,' in which the poet Wordsworth describes the form and scenery of the region he knew so well, and I acknowledge with pleasure that his simile of a wheel fully embraces the idea of radiate symmetry to which I have referred. Wordsworth is careful, also, to point out the different orders of scenery in the valleys, depending on their mode of formation, and he dwells especially on the low deltaic headlands which diversify the lake-shores, and threaten, as he recognized, to fill up the lake-basins.

II. Limnology.

While the lake-basins might truthfully have been described as unknown England, they had at various times been sounded in an irregular way. The number of soundings taken in many of the lakes would have sufficed to give a good idea of the configuration of the lake-bed if they had been made systematically with that object. Limnology, the science of lakes, is a branch of geography which has budded but recently, and is still little cultivated. Most of the facts concerning it have been ascertained by geologists often in search of evidence to confirm or overthrow special theories, and by naturalists while dredging the fauna of the depths. Many soundings have also been made simply to find the deepest part, and satisfy local curiosity as to the greatest depth. Some knowledge of the general character of lake-basins enables one to arrange soundings which will not only satisfy curiosity, but also permit the depths to be accurately mapped, and display their true character, allowing the average depth and total volume to be calculated.

Geography, rightly considered, is not a mathematical science concerned with the description and delineation of an unchanging arrangement of surface features. It has to take account of processes of change, to concern itself with a certain range of time past and time to come, in order to comprehend the present position of affairs. In the case of limnology, a lake-basin represents the product of past changes, in process of further change to some different future condition. This change is not always of the slowness characterized as "geological." Mr. Grant Wilson found, in 1888, that the delta at the head of Loch Tay had advanced one-third of a mile since the Ordnance Survey of the district

in 1861 *—a length of 8 inches on the largest-scale map. The deltaic land at the head of Windermere shown in Fig. 2 closely resembles that at the head of Loch Tay. The rocky promontories seen on the right of the stream were evidently rocky islands added to the land by deposits from the river. The original hollow may be produced by Earth-movements, or by glacial scour, or by some obstruction being laid down across a valley, and, once formed, its filling with water is a question of climate. When rainfall exceeds evaporation, the streams entering the lake maintain the level of its surface as far above the lip of the lowest part of the

FIG. 2.—HEAD OF WINDERMERE, SHOWING DELTAIC LAND.
(*Photograph by Mr. A. Pettitt, Keswick.*)

edge as the escaping river permits. If evaporation were in excess, as in Central Asia or Western America, the lake-basin could not be filled sufficiently to overflow.

The processes of change in a lake-basin are more readily seen than the causes of formation. They tend, as a rule, toward the effacement of the lake by filling up and draining. The former takes effect by the pouring in of sediment, washings of the land, pebbles and sand crushed by the collision of blocks of rock in mountain torrents, or finer particles of clay, where the streams cut through ice-formed deposits. The

* 'A Bathymetrical Survey of the chief Perthshire Lochs and their Relation to the Glaciation of that District,' *Scottish Geographical Magazine*, vol. iv. (1888), p. 251.

organic life of the lake aids the process: the minute organisms, secreting carbonate of lime and silica, gradually form beds of marl, and plant-growth in the shallow water converts the clayey or sandy soil, formed by stream detritus, into a spongy mass, felted by decaying root-fibres, and tending to raise the level of the lake-bed more rapidly than any other agent. The second process is the eroding action of the escaping stream on its bed, which gradually lowers the outlet, and thus ultimately tends to drain the lake. When the lake occupies a true rock-basin this process is extremely slow, because the clear water, freed from sediment by its repose in the lake, has little erosive power; but when the barrier is merely a bank of stiff clay containing boulders of all sizes, it may be comparatively quickly worn through, provided the gradient of the stream-channel is sufficient, and the lake behind it is in time converted into a marsh or meadow. The valleys in the neighbourhood of Haweswater contain several interesting instances of such naturally drained lakes (see Fig. 14).

In a newly formed lake, the coast-line follows the contour of the valley sides, the rocky parts as a rule appear as promontories, and the inlets of streams are bays where the contour-lines retreat up the gulley the stream has carved for itself. Professor Forel has pointed out * that if the land be stationary with regard to vertical movement, this state of matters cannot long continue, as every stream throws down its load of stones in flood-time on the bed of the lake, and the pile grows until it forms a cone of dejection or delta, over which the stream may meander in several channels. Such a delta causes a low promontory of shingle or sand to grow out from the edge of the lake, and in time the promontories would tend to be of soft low ground, while the original rocky masses between neighbouring streams would be left guarding the heads of bays (see Fig. 9). Thus the character of cliff and promontory may afford a clue to the relative age of the actual coast-line.

If the bed of the lake is undergoing depression through Earth-movements in comparison with the surrounding land, the growth of deltas may be so far checked as to be non-apparent, and the streams would empty themselves into the heads of narrow bays or fjords. This is not the case in any of the English lakes, with the possible exceptions of Pull Wyke on Windermere and Howtown Wyke on Ullswater. Stones or soil slipping down a steep hillside into a lake, like the screes on Wastwater and Ullswater, may be looked upon as special cases of deltaic action in which the detritus bears an overwhelmingly large ratio to the running water. Scree-shores present some interesting features, which will be referred to in detail when the separate lakes are described.

In lakes so narrow and sheltered as those of England, wave-action counts for little, although M. Forel has shown, in his great treatise

* 'Le Leman,' vol. i. Geneva, 1892.

on the Lake of Geneva, that in a wide expanse of water it has a very marked effect. Even in the English lakes the result of wave-action has been traced. Although it has not diminished the sharpness of the glacial striæ engraved on the hard rocks of the Ullswater islands, it produces marked erosion on the turfy shores of Derwentwater and Windermere, and on the margins of sandy deltas (see Fig. 19). Wave-action, slight though it is, has probably a good deal to do with shaping the gently sloping beach which extends from the water's edge in most instances as a gravelly or mud-covered slope, and then sinks abruptly into the depths of the lake.

The heavier portion of the detritus rolling down the hillside or carried along by flooded streams stops on the flat beach, and it is curious to see long lines of boulders ranged along the water's edge in some lakes as uniformly as if they had been placed by the hand of man. Pebbles and gravel are carried farther out on the slopes; sand and sometimes clay lies beyond them, and, in the centre, the bed of all the larger lakes is carpeted with the softest and finest mud.

On the hillside the agencies of sun, air, and rain all make for increasing diversity of outline, and the contour-lines of the land are twisted into innumerable juts and bends by the action of natural sculpturing. Under the surface of still water there is an abrupt contrast; erosion ceases, and the gentle modelling of the plastic sediment tends to reduce angles and fill up all irregularities of outline. Thus the subaqueous contour-lines flow in freer curves, and, however minutely they are delineated, they have a more generalized form than those on land.

Professor Penck lays great stress on the ratio between the average depth of a lake and its maximum depth as an index of the general form of the basin.* Thus when the average is more than fifty per cent. of the maximum (as in the Lake of Geneva, Buttermere, Crummock, and Wastwater), the form of the basin is that of a chaldron; if notably less, it is that of a funnel. Strictly speaking, I believe this comparison is only applicable to lakes of substantially the same type.

The object of our survey was to lay down on maps the isobaths or contour-lines of depth, and so to compare the scenery of the subaqueous with that of the subaërial region of the Lake District. I fear that this comparison, however completely it may be made, cannot throw much light on the origin of the lake-basins, for the original hollow, whether it were the result of cracking or crumpling or scooping, must be by this time effectually covered by the blankets of ever-thickening sediment, through which no distinct evidence of primitive form can be felt.

It is essential, in an accurate survey of this sort, to connect the sublacustrine contours with the sea-level altitudes fixed by the Ordnance

* 'Morphometrie des Bodensees,' *Jahresbericht Geog. Ges. München*, 1894, p. 119.

Survey on land. This must be done at the time when soundings are made, as no records exist, except in the case of Derwentwater, so far as I could ascertain, of the variations of the lake-levels from month to month. Thus it was impossible to utilize the earlier soundings, even in those cases where they were made accurately—as, for instance, by the geological surveyors—to supplement our recent work. We found them of great use in determining the position and direction of our sections, but the soundings themselves were never such as to permit contour-lines of depth to be drawn with any confidence. The earliest record of regular soundings I have found is in a folio volume, entitled 'A Survey of the Lakes of Cumberland, Westmorland, and Lancashire,' by James Clarke, Land Surveyor (London, 1787). Subsequently, Peter Crosthwaite, "Admiral of the Keswick Regattas, and Hydrographer to the Nobility, Gentry," etc., made a series of soundings, which he embodied on rough maps of his own construction and published separately between 1792 and 1810. The late Mr. J. Clifton Ward, while engaged on the geological survey of the district, and his colleagues, Mr. Dakyns, Mr. De Rance, and others, made numerous soundings about fifteen years ago in nearly all of the lakes and tarns. These soundings are recorded on the 6-inch maps of the Geological Survey, only a few of which have been published for the Lake District; but I have had access to the manuscript maps at the Jermyn Street Museum, through the courtesy of the Director-General of the Geological Survey, Sir Archibald Geikie, and the kindness of my friend Mr. W. Topley.* Separate soundings have been taken by various people interested in some of the lakes, especially in Derwentwater, where a knowledge of the depth is important for fishing; and in Thirlmere, where the engineers of the Manchester Waterworks made a survey sufficient to enable them to calculate roughly the volume of the lake. All these, so far as it is useful to do so, will be referred to in the discussion of the separate lakes.

III. Methods.

All our soundings were made from rowing-boats, which were hired, or lent by their owners. We made an attempt to obtain the use of a steam-launch on Windermere, but several gentlemen who kept launches on the lake and were applied to frankly expressed their entire lack of interest in anything beneath the surface; so, as there were no launches on hire, we found a rowing-boat sufficient for the purpose.

The materials used were simple. A sextant was employed for the angular determination of positions when that was necessary, and an

* I cannot pass this reference without placing on record the great debt I owe to Mr. Topley, and the profound regret with which geographers, as well as geologists, regard his untimely death.

Abney's level for estimating the water-level with reference to a convenient bench-mark. There were several sounding-lines, all of well-twisted hemp line about three-quarters of an inch in circumference. This had been soaked, stretched, and dried repeatedly, and was finally measured and marked, while wet and under a slight strain, at every fathom. The marks were tufts of coloured worsted twisted through the strands, blue being used, except for the fives, which were white, and the tens, which were red. The latter consisted of a single tuft for 10 fathoms, two for 20, three for 30, and so on. Two 10-fathom lines, two 25-fathom lines, and one of 60 fathoms were taken. The correctness of the marking was frequently verified while the lines were in use, and when stretching or shrinking took place allowance was made in plotting the results of the sounding. The soundings were read in fathoms and feet, and are reduced to feet for convenience in plotting the contours. For work in less than 10 fathoms (60 feet) a lead weight of 3 lbs. was used, and in perfectly still weather the same lead could be used safely to 15 fathoms. We usually employed a 5-lb. lead for all depths over 10 fathoms, and this lead was constructed with a brass tube passing through it, so as to bring up a sample of the bottom. The simple open tube worked very well in clay, and perhaps brought up a sample one time out of five in mud; but it was not to be altogether relied on, and when a sample of the bottom was particularly wanted from a special place, a good deal of time was often lost in obtaining it. In order to prevent the gunwale of the boat from being cut by the line, and to diminish friction in hauling up, a piece of thin sheet-lead was moulded on the side of the boat, usually on the starboard bow. Occasional observations of temperature were made at various depths by means of a Negretti and Zambra deep-sea thermometer mounted in the Scottish frame.

The method of working was to row across the lake, steering a straight course from one point to another, stopping at every tenth, fifteenth, or twentieth stroke of the oars, as the case might be, to take a sounding. The length of the interval was regulated according to the length of the section and the regularity of the arrangement of depth, but at the beginning and end of a section the normal interval was always halved, so as to keep account of the steeper and changing gradients always found near shore. At first the number of soundings to a mile was about fifty-six; but these, being only about 30 yards apart, were found to be unnecessarily close, so that the intervals in our late work were made usually of double the length, twenty-eight soundings to the mile, successive soundings being 63 yards apart. Cross-sections were usually sounded out at intervals of half a mile or less along the lake, and they were connected by diagonal sections, and afterwards crossed by longitudinal sections, the detail being filled in by lines of soundings across the deeper bays.

The shore ends of each section were determined at the time on the 6-inch Ordnance map, the exquisite minuteness of which enabled us to put down our position often within a foot of absolute accuracy. It happened occasionally, however, and that too frequently, that different counties bordered a lake, so that only one coast was shown in detail. Then our positions on the blank coast were fixed by sextant bearings from prominent objects on the opposite side. Occasionally, too, in a long section it was impossible to allow for drift due to a variable wind, and then we anchored the boat about the middle and took sextant bearings, so as to have a fixed point. In addition to this, cross-bearings

FIG. 3.—METHOD OF SOUNDING.
(*Photograph by Mr. John Thomson.*)

were always noted when prominent objects came into line; and in lakes where there were several islands, these bearings gave several fixed points in every section, and enabled us to check the intervals measured by the oar-strokes.

At several points along the shore of some of the lakes very careful measurements of the slope of the lake-bed were made. This was done by landing an assistant with one end of a long marked line, backing the boat out gently in a straight line, and taking a sounding as each fathom-mark of the strained measuring-line passed a given point on the side of the boat.

Each evening the work of the day was plotted on the 6-inch map, the positions and cross-bearings being calculated, and provisional

contour-lines were drawn. Next day any doubtful points which arose were settled by additional observations. Ultimately, the whole work was recalculated carefully by Mr. Heawood, and copied on a new set of 6-inch maps, on which contour-lines of each 50 or 25 feet of depth (with the 10-feet line in some places) were shown. From these maps the areas between consecutive contours were calculated in the Ordnance Survey Office at Southampton, and the volume and mean depth were afterwards deduced from the results. The volumes of the lake basins were also calculated at Southampton by a somewhat different method, and the results were, on the average, 2 per cent. greater than mine; the depths of Derwentwater and Bassenthwaite, however, came out as 5 per cent. greater. The mean depth deduced from these calculations was in no case more than 1 foot greater than the figures given in the paper. The divergence probably arose from the Survey working only from the contour-lines, while I made allowance for the shallow rim of beach. Mr. Heawood also made pantograph reductions of the whole set of maps to the scale of 2 inches to a mile, and these, with the detail of the surrounding land added, and the point where each sounding (in the case of Derwentwater and Bassenthwaite, each alternate sounding) was made indicated by a dot, are published with this paper. The lake contour-lines on these maps refer to depth below the actual surface of the lake; but on the 6-inch maps prepared by the Ordnance Survey, the sub-lacustrine contours are calculated from sea-level. Sections were drawn of all the lines of soundings which ran nearly at right angles to the axis of the lakes, both on a true scale, and with sufficient vertical exaggeration to bring the prominent features clearly into view. Longitudinal sections were also drawn on the same scale, as a rule, following the axis of greatest depth. Specimens of these, attached to the maps, are used to illustrate the paper.

The help we received in the work on the different lakes will be acknowledged in each instance. As a rule we did not employ boatmen. When we did, their rowing was often found to vary in strength, and they showed a strong aversion to continue working in rain. On Bassenthwaite, Coniston, Wastwater, Windermere, and the greater part of Ullswater, Haweswater, and Derwentwater Mr. Heawood rowed, and the value of his stroke was found, in plotting the results, to be almost invariable. In these lakes I took almost all the soundings myself, while Mr. Heawood sounded Ennerdale, Buttermere, and Crummock. Mrs. H. R. Mill steered and kept the note-book in most cases of the first group, and we had also the assistance of Mr. A. J. Herbertson on Bassenthwaite and Ullswater, while Mr. Heawood was helped on the second group of lakes by Mr. R. Shields. Sir Charles Wilson and Colonel Farquharson, successive directors of the Ordnance Survey, have most kindly interested themselves in the work. This survey altogether was a piece of pure scientific research, those employed in it giving their

time freely, while all expenses incurred for apparatus, hire of boats, and travelling were defrayed by the Royal Geographical Society.

The views of the lakes shown in illustration, only a few of which are reproduced, were mainly from special photographs taken by Mr. Ellison of Perth, an enthusiastic amateur, and Mr. John Thomson, who accompanied us on the Windermere survey, while those of Haweswater were my own, taken with a Frena hand-camera.

IV. Derwentwater.

From the geographical point of view, Derwentwater is unique amongst the English lakes. All the others are comparatively long and narrow; Derwentwater is relatively wide, giving it, when seen from

FIG. 4.—GENERAL VIEW OF DERWENTWATER FROM THE NORTH.
(*Photograph by Mr. A. Pettitt, Keswick.*)

a height, the appearance of a great expanse of water. Unlike the other lakes, it has numerous islands distributed irregularly over the surface, and these islands appear to be flat heaps of rough stones; at least, all of them are surrounded by gently sloping stony beaches. The area of the lake is a little over 2 square miles, and its total drainage area is almost 32 square miles, so that the water-surface is about one-fifteenth of the whole. The lake lies north and south; its extreme length is 2·87 miles, and its average breadth (calculated from its area) 0·72 mile (or 1270 yards), while its extreme breadth is 1·21 mile (2130 yards).

The drainage area of the lake consists mainly of Borrowdale on the south, down which the river Derwent flows; the watershed runs very near the banks of the lake on the east and west. Physically, Derwentwater

and Bassenthwaite are one lake separated by the low alluvial plain formed by the Greta and Newlands Beck, which extends for 2½ miles between the northern extremity of Derwentwater and the southern extremity of Bassenthwaite (see Fig. 6). This plain is so flat that it is said to be occasionally completely submerged in a heavy flood, when a continuous sheet of water stretches for 10 miles. The contour-line of 300 feet above sea-level cuts the Derwent 1½ mile south of the upper end of Derwentwater, and, diverging gently, runs along both banks of the lake at an average distance of a mile apart from Lodore to Keswick. Here the valleys of the Greta and of Newlands Beck widen the contour-lines to a distance of 1½ mile apart, but they approach to within three-quarters of a mile at the upper end of Bassenthwaite. It is impossible to doubt that the two lakes occupy one depression. The level of Bassenthwaite Lake is about 21 feet below that of Derwentwater, and the plain between slopes northward in its full breadth, presenting none of the features of a valley; for there is practically no slope from the sides toward the central river, but, as the general map shows, the Greta and Newlands Beck flow side by side along it, and the little Pow Beck between the two runs parallel also for the greater part of its course before it swerves to the left and joins the Newlands.

Turning particularly to Derwentwater, we see that the form of the coast-line is largely due to the streams which enter it, as will be shown when describing the configuration of the bed of the lake. The banks on the south-west and the southern part of the west coast are in several cases composed of rock sloping steeply into the water. On the east side cliffs occur at Scarfclose Bay, where the action of waves driven by the prevailing winds against a clay cliff is well shown, and at the promontory of Friars Crag, which is hard rock. Derwent Island, opposite the Keswick boat-landings, and Lord's Island, a little farther south, lie within 200 yards of the shore, and are separated from it by depths of less than 10 feet. This is the case with other small islands, and the only ones which lie near the centre are St. Herbert's Isle and Rampsholme, with the shoal known as the Scarf Stones, south of the latter. All these islands appear to be low heaps of large loose stones covered with soil and vegetation. Round their shores the large blocks of stone may be traced to a considerable depth below the water, and a similar formation is to be seen at most parts of the shore of the lake, except in the few instances where stream deltas cover the stones with shingle or sand, or where rocky cliffs touch the water's edge.

At the time of our visit, June 22 and 23, 1893, the level was lower than had ever previously been recorded. It is an excellent custom at Keswick to insert an inscribed tablet, or cut into the rock at Friar's Crag a record, of every exceptionally low level of the lake, and we found that the record for 1893 was 4¼ inches lower than in the famous summer of 1887, which was the lowest up to that date. The record for 1827 was

6 inches higher, and that for 1868 7 inches higher, than for 1893. The level of the surface of the lake is given on the Ordnance Survey maps as 238·3 feet in December, 1862; but levellings made in 1894 showed that the marble slab dated June, 1893, is exactly 244·4 feet above mean sea-level, the former figure being due to a mistake. Mr. John Marshall of Derwent Island has, in continuance of his father's habit, kept a daily record of the height of the lake, and he kindly furnished information on the subject for this paper. The zero for this determination was fixed in 1851 as an ordinary summer low level, and by the new determi-

FIG. 5.—FRIAR'S CRAG, DERWENTWATER, JUNE, 1893, SHOWING THE LAKE AT ITS LOWEST RECORDED LEVEL. LORD'S ISLAND IN THE BACKGROUND.

(*Photograph by Mr. W. Ellison.*)

nation it corresponds to an altitude of 245·4 feet. In 1892, the highest record was 6 feet 8 inches above, and the lowest 3½ inches below, the datum, giving a range of practically 7 feet. The greatest height of the water in Mr. Marshall's records was 8 feet 5 inches on November 26, 1861. This would give 9 feet 5 inches as the maximum recorded range. Thus it appears that the average depth of 18 feet would be increased to 27 feet 5 inches by the greatest floods observed; in other words, the lake, when we surveyed it, contained less than two-thirds of the quantity of water it is known to have temporarily held.

The soundings on Derwentwater were made along 33 distinct sections, the total length of which was 19 miles, and there were altogether 1088 soundings, which gave 57·3 soundings per mile of section, or 527 per

square mile of area. These soundings enable us to calculate the volume of water in the lake at the time as 1010 million cubic feet, and the average depth as 18 feet. That is to say, a vertically walled reservoir of the same superficial area as the lake would, if made uniformly 18 feet deep, contain the same quantity of water. The mean depth is only 25 per cent. of the maximum depth, by far the smallest ratio found.

The arrangement of depth, as shown by the contour-lines of 10, 25, and 50 feet on Map II., is the most complex which was met with in any lake. From the head of the lake to a line drawn from Brandlehow Point to Barrow House the depth was under 10 feet. This great flat shallow, measuring roughly one quarter of a square mile, was unapproached for extent in any other lake except Bassenthwaite. The Derwent enters the lake at the apex of a large delta composed of fine shingle and sand, and the Watendlath Beck runs in at the south-east corner in a bay formed by the more rapid sedimentation of the main river. The Barrow Beck farther north has built a large delta, which is a conspicuous feature on the coast-line, while both on it and on the main delta the river entrance is found on the down-lake side. The deepest water lies between Brandlehow and Falcon Crag, depths over 50 feet occurring in two irregular patches separated by a curious tongue of shallow water (under 25 feet), which appears to be a direct prolongation of the Derwent delta. The deepest water of the lake occurs in the eastern depression, almost midway between Scarfstones and Barrow Point; it is only 72 feet. The way in which Barrow Beck has carried sediment into this hollow is beautifully marked by the curving of the 10, 25, and 50 feet contour-lines. The deep water stops at a line drawn from Otterbield Point to the Cat Gill, north of Barrow Point, so that depths over 35 feet are entirely confined to the southern half of the lake, in which there are no islands. The northern half of the lake may be looked on as a nearly flat plain averaging about 14 feet in depth, but grooved from south to north by three furrows running from the deep-water area, and separated from each other by two ridges. These furrows are defined by the 25-feet contour-line, and in each the depth increases slightly but suddenly close to the northern end. The central furrow runs from the end of the central ridge, which divides the deep basin into two parts, and terminates at Friar's Crag. Pennant, in one of his famous tours before 1776, describes this furrow, and ascribes it to the action of the Derwent flowing through the lake. He gave the greatest depth in it as 20 feet, and was not aware of the existence of deeper water to the south. Other early writers speak confidently of depths of 40 fathoms where we found only 4 feet.

The central furrow is separated from the eastern (which terminates at the north point of Scarfelose Bay) by the broad ridge which rises above the surface in Scarf Stones, Rampsholme, and Lord's Island. The western furrow ends off Copperheap Bay so far as the 25-feet line shows, but it is distinctly indicated by the soundings for a quarter of a mile

further north. It is separated from the central furrow by a broad ridge, on which St. Herbert's Isle, two shoals previously unmapped, and Derwent Island rise. This curious formation contains much controversial material. The three furrows suggest three river-channels. The central ridge across the deep area can hardly be sediment from the river; it suggests, rather, an eskar. If it had not been for the central furrow, the configuration would closely resemble two lake-basins side by side. It is difficult to select a typical longitudinal section, but No. 5, shown on the map, from the Derwent delta to Derwent Island, shows some of the characteristics of the eastern half of the lake.

Section 1, drawn from west to east across the northern slope, and Section 2, across the southern slope of St. Herbert's Isle, show not only the three main furrows and the two main ridges, but indications of several others. Indeed, it would appear that the whole bed of Derwentwater is scored by grooves and scarred by ridges, all running from south to north parallel to the axis of the lake, and suggesting some forms of glacial accumulation. Section 3 runs through the two great depressions and the ridge dividing them; while Section 4, from Brandlehow Point to Barrow Point, serves to illustrate the steep descent of the rocky shore on the south-west, and remarkably level floor (broken by a heap of stones) which characterizes the southern end of the lake, the southern end of the eastern hollow, and the steep slope of the Barrow delta. The position of each of these sections is shown upon the map by letters corresponding to the terminal points.

The stony character of the islands and of many parts of the lake-shore has been already mentioned. I am inclined to believe that the true floor of the lake is entirely covered with large flat stones, although in the deep water they are covered with the fine dark-brown mud which is always found carpeting the greatest depths of lakes, and on the extensive flats under 12 feet in depth they are covered by a peaty layer composed of a felted mass of the roots and stems of water-plants and soil resulting from their decomposition. No lake, not even Bassenthwaite at equal depths, contained such a wealth of water-plants as Derwentwater. Off the north end of Lord's Island the boat-hook was pushed down through 18 inches of this muddy peat, and struck against stones below, which appeared to be large and flat, similar to those visible on the much steeper slopes of St. Herbert's Isle and Derwent Island and in the Scarf Stones. Near the north-west shore of the lake small patches of stones were seen in depths of from 6 to 8 feet, from which the peaty covering appeared to have been torn away, the remainder lying with sharply cut edges.

The floating island was visible during our stay, exactly in the position which Mr. Symons assigns to it in his book, 'The Floating Island in Derwentwater.' Only a small area of the weed-covered carpet of the lake had risen to the surface like a large blister, and the surface

was not solid enough to land on. The water between the floating island and the shore to east and south was in no place more than 3 feet deep, and usually considerably less. Probing the margin of the island, we found that a boat-hook could easily be driven in 5 feet 6 inches without meeting a solid foundation. On its withdrawal it was followed by a rush of gas smelling slightly of sulphuretted hydrogen, but, as the wind was high and rain falling at the time, it was impossible to find whether it would burn. My observation of the island inclines me to believe in Mr. Symons' theory of its formation by the buoying effect of gas entangled in the vegetable felt. I would meet his difficulty as to why the peaty carpet should not be thick enough to form "bobbing islands" in other parts of the lake by the observation that in no other part is the floor of the lake so flat for a large area, and that, in the bay where the floating island lies, the current of the Derwent and the Watendlath Beck probably give rise to an eddy which promotes the accumulation of fine sediment, the aëration of the water, and the healthy growth of water-plants.

Several observations of temperature were made on Derwentwater. On June 22 the surface water was between 67° and 68° Fahr.; on the 23rd, between 67° and 64°, the Derwent bringing in colder water on account of rain; while on the 27th the surface temperature was 63·5°. Temperature soundings were made in the eastern depression on the 22nd and 23rd, and showed that the water was at nearly the same temperature (over 66°) from the surface to a depth of 20 feet, then fell rapidly to 61° at 30 feet, 57° at 50 feet, and 50·3° on the bottom in 70 feet. The arrangement of surface temperature showed the effect of the wind, being warmer on each day along the leeward shores, and colder to windward, where the warm surface layer had been blown away.

Special thanks are due to Dr. Knight of Keswick for his deep interest in the work, and the many forms of help he gave us; and also to Mr. Brooker for the loan of his boat, and for giving us the benefit of his great knowledge of the lake.

V. Bassenthwaite.

The relation between Bassenthwaite and Derwentwater has been already explained, but the lake itself, though perhaps the least interesting from the scenic point of view, presents certain remarkable features in its physical geography. It is exactly the same size as Derwentwater, a little over 2 square miles, but, being 3·83 miles in length, its average breadth is 0·54 mile, or 950 yards, the same as Windermere. The widest part of the lake, near the mouth at the bay below Bassenthwaite Lake Station, is exactly three-quarters of a mile, and almost the same breadth is found in the deeply cut Bowness Bay. The drainage area is the largest of any of the lakes, for Bassenthwaite alone receives contributions from heights lying outside those which have their

orographic centre on High Raise. The direct drainage area measures 91½ square miles, or forty-four times the area of the lake. This appears more remarkable when we remember that the drainage areas of all the other lakes are only from twelve to twenty times as great as their water-surface. Adding the areas draining into Derwentwater and Thirlmere, the surplus water of which enters Bassenthwaite, the total catchment area of that lake amounts to 134 square miles; while all the other lakes together, with a water-surface of 15 square miles, have a total of 230 square miles of drainage area. The main tributary of Bassenthwaite is

FIG. 6.—DISTANT VIEW OF BASSENTHWAITE LAKE FROM CASTLE HEAD, SHOWING THE ALLUVIAL PLAIN SEPARATING DERWENTWATER AND BASSENTHWAITE, WITH SKIDDAW IN THE BACKGROUND ON THE RIGHT, AND THE TOWN OF KESWICK IN THE FOREGROUND.

(*Photograph by Mr. W. Ellison.*)

the Derwent, entering at the south-east corner with the over-flow of Derwentwater. It is joined at its outlet from the higher lake by the Greta, flowing from the east, swollen by the Naddle Beck and St. John's Beck (from Thirlmere) on the left, and by the Glenderaterra and Glenderamackin Becks on the right, as well as smaller streams flowing from the south and east of Skiddaw. At the south-west corner of Bassenthwaite the Newlands Beck enters from a valley running parallel to Derwentwater on the west, as Naddle Beck does on the east. The

western side of Bassenthwaite is very uniform in outline, and bordered by steep wooded slopes rising directly from the lake, whence only two noticeable streams flow: Beck Wythop, which has formed a beautifully rounded deltaic promontory in front of its valley opposite Bowness Wood: and Dubwath Beck, which enters near the railway station at the north end. The eastern coast is much flatter, the steep escarpment of Skiddaw trending northward, while the lake-line runs north-west. The coast-line is broken near the middle by three promontories of low land: Scarness on the north, long and narrow; Broadness, forming a square jut; and Bowness, farther south, of tongue-shape. Sharply curved bays of shallow water run in between these points, but neither promontories nor bays receive any streams larger than drains. North of Scarness, a stream formed by the junction of Dash Beck and Chapel Beck, from the northern slope of Skiddaw, comes in over a well-marked delta of steep slope.

The altitude of the water-surface was determined by the Ordnance Survey as 226 feet on October 3, 1864. No record has been kept of the fluctuations of the lake-level so far as I have been able to ascertain. The breadth of the exposed beaches on the flat shores of Derwentwater and Bassenthwaite was practically equal at the date of sounding, indicating that both lakes had shrunk in the same proportion. Colonel Farquharson, Director of the Ordnance Survey, kindly undertook to have the exact difference of level between the two lakes determined by a special levelling in May, 1895. It was then found that the surface of Bassenthwaite stood at 224 feet, that of Derwentwater at 245 feet, giving a difference of 21 feet, and since Derwentwater at the time of sounding had the level of 244·4 feet, that of Bassenthwaite may safely be taken as 223·4 feet above the sea.

We were engaged in sounding Bassenthwaite on June 24 and 26, 1893, hiring a boat from the landing near Bassenthwaite Lake station. Twenty-five lines of soundings were made of an aggregate length of 13 miles, and containing 735 soundings, *i.e.* 56·5 per mile of section, or 355 per square mile of area. The volume of water, deduced from the contoured map which gave expression to the soundings, was 1023,000,000 cubic feet, about 13,000,000 cubic feet greater than Derwentwater; while the average depth was 18 feet, the same as in the more picturesque lake. The greatest depth found was 70 feet.

The general configuration (see Map III.) was very simple compared with Derwentwater, and the areas at equal depths were different. Bassenthwaite had a much larger extent of water under 10 feet in depth, a smaller proportion between 10 and 25 feet, and a considerably greater amount between 25 and 50 feet, indicating a generally steeper slope. The map shows that the upper end of the lake is very shallow, especially along the east side where the

Derwent flows in, and in all the large bays of the east coast and the large bay on the north-west where the Dubwath Beck enters. Depths over 25 feet are confined to a uniform trough nearly 2 miles long, running down the lake from a point three-quarters of a mile from the head, and stopping abruptly off Scarness Point. The 25-feet line runs along the sides parallel to the 10-feet line, but is closer to it along the west than the east shore, except off Broadness. It clearly shows the prolongation of a shallow bank half the breadth of the lake along the south-eastern side. The deepest water lies in a comma-shaped depression defined by the 50-feet line, the rounded head at the southern end, and the tapering tail keeping close to the 25-feet line along the west coast, showing a steep continuous slope under the steep western shore to the greatest depth, and a much gentler terraced slope from the eastern side. There are indications of a slight groove parallel to the main depression running from the bay east of the entrance of the Derwent close along the south-eastern shore for nearly three-quarters of a mile, but the indications are not very clear, possibly because the lines of soundings were not drawn sufficiently close.

The sections across the lake are much more distinct in their suggestions of a double-troughed depression separated by a broad central rise. No. 2, from Blackstock Point to the opposite shore, crosses the southern end of the great depression, and then the broad plateau to the east. No. 1, half a mile farther north, shows the steep slope from the west side into the main depression, the more gentle rise, central plateau, and distinct hollow on the eastern side, where a sounding of 25 feet was found close to shore. No. 3, from the Beck Wythop delta to Bowness Wood, shows the very abrupt descent from the east side into deep water and the central rise; while No. 4, from Smithy Green to the south point of Scarness Bay through the deepest part, shows the same features reduced in intensity. Section 5 is taken along the axis of maximum depth from the inflowing to the outflowing river.

From these sections I conclude that the general structure of Bassenthwaite presents considerable analogies to that of Derwentwater, of which the most important are its general shallowness and the existence of parallel channels running along the lake.

Two sections to a true scale (Fig. 7) show the slopes of the bank for about 150 feet from shore. The particulars of these sections are given below. They were made by fixing one end of a long marked line on shore, backing the boat out so as to keep this line taut, and taking a sounding at intervals of 6 feet of distance. The Bowness Point observation, No. I. (Ab), was on the east shore of the lake; the Beck Wythop observation, No. II. (Aa), was off the delta of that stream on the west shore. The soundings are given in feet.

Distance from shore	0	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126	132	138	144	150 ft.
No. I. depth	0	–	1	1	1	2	—	4	5	5	6	6	6	7	7	7	7	8	10	10	13	17	19	22	—	— ft.
No. II. depth	0	1	1	1	4	7	9	13	15	16	18	21	23	24	25	27	29	30	31	33	33	36	36	37	39	41 ft.

No. I., the more gradual, averaging 6° down to a depth of 12 feet, is off Bowness Point (Ab, F on map), and the more abrupt off Beck Wythop delta (Aa, E on map), showing the characteristic rapid slope due to the sliding of gravel and stones. Its average slope, beyond the beach 18 feet wide, is 17½°. Except off the growing deltas on the east side, there are indications in the sections of a narrow bench or terrace running round the lake from 8 to 15 feet below the present water-level.

Contemporaneous wave-action was shown in several places along the shingly slopes on the east side in the form of a shallow lagoon, dry at

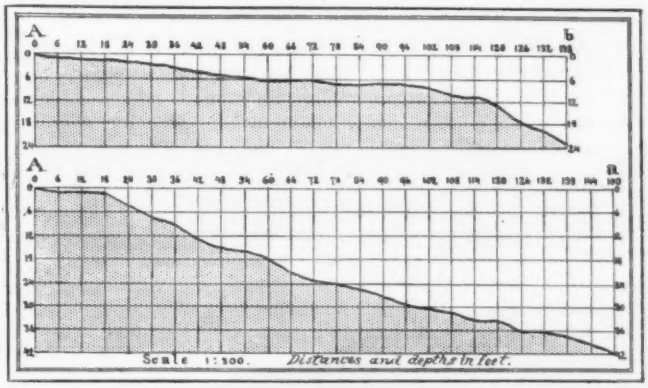

FIG. 7.—SECTIONS OF SLOPE IN BASSENTHWAITE LAKE IN A TRUE PROPORTION.

the low level found on our visit, perhaps 3 or 4 inches deep, several feet wide, and 50 feet or more in length, running parallel to the lake, and separated from it by a low ridge of stones and shingle.

The steep slopes of the lake above and below water were always composed of smooth rounded stones, much smaller than the great blocks of Derwentwater. The stones were only observed to be covered with mud on the shallow flats at the north-west and southern ends, and, except for some rushes and water-lilies in the south-eastern corner, there were remarkably few water-plants, and no sign of a peaty floor. Well out in the lake the sediment was always found to be soft mud.

The surface temperature on the two days varied from 63° to 64° Fahr., at 15 feet it was 63° in several parts of the lake, and in the centre of the main depression off the middle of Broadness the temperature at 30 feet was 62·2°, and at the bottom (66 feet) 58·3°—considerably higher than at

like depths in Derwentwater. This may result from a large part of the inflowing water being derived from the surface layers of Derwentwater, which are very warm in summer.

VI. Buttermere and Crummock.

The double lake of Buttermere and Crummock presents obvious analogies to Bassenthwaite and Derwentwater, but the differences outweigh the resemblances. The lakes lie in a long narrow valley at first directed north-west, then turning sharply to north-north-west. The land contour-lines from 400 feet to 800 feet run close to each other along both sides of the entire valley, presenting a uniformly steep hillside indented

FIG. 8.—VIEW OF BUTTERMERE FROM CRUMMOCK WATER LOOKING NORTH, SHOWING THE FLAT LAND BETWEEN THE LAKES.
(*Photograph by Mr. A. Pettitt, Keswick.*)

by only a few shallow lateral valleys. The hills rise to elevations of over 2000 feet along the eastern edge, where the slope is perhaps a little less steep than on the western, though the summits on the west above Crummock Water are a little lower. The plain separating the two lakes is absolutely flat and lies across the mouth of the lateral valley of the Mill Beck coming from the east. This stream, unlike the Greta, turns abruptly northward to the lower lake without reaching the short river flowing out of Buttermere, which has been pushed over by the alluvium of the Mill Beck close against the base of the steep slope on the east side. This plain is just three-quarters of a mile in length (see Map IV.).

Buttermere itself is 1·26 mile in length, and as its area amounts to only 0·36 square mile, its average breadth is 0·35 mile (620 yards), and as the lake is very uniform in outline this breadth is that actually found, the maximum being only 670 yards. Its drainage area is 6¼ square miles of mountainous country, mainly to the south, and this is eighteen times greater than the water area. The chief streams are the Warnscale Beck, which enters at the southern corner; and the Gatesgarth Beck, coming in about the middle of the south-east end of the lake, forming a deltaic projection in what would otherwise be a straight coast-line. The Hassness How Beck, near the upper end of the lake on the north-eastern side, forms by its delta the only pronounced irregularity of the right shore; and the Comb Beck opposite it on the left side has also formed a little promontory, the lake between the two being constricted in width. Many small becks foam down the hillsides, but the only one it is necessary to mention is Sourmilk Gill, which flows in at the north-western corner, just beside the outlet. The lower end of the lake starts at right angles from the left shore, but it is rounded off on the right by the usual horizontal curve of the up-lake end of a delta.

The surface of the lake stands at an altitude of 331 feet according to the Ordnance Survey, but the date of this determination—probably 1862 or 1863—is not stated.

The lake was sounded on October 31, 1893, by Mr. Heawood and Mr. Shields, who made 10 sections of 3 miles in total length, and 86 soundings, *i.e.* 29 per mile of section, or 3·8 per square mile. Measurement from the contours gives the total volume as 537·5 million cubic feet, and the average depth 54¼ feet. The fact that this, the smallest of the true valley lakes (if we except Hayes Water), is on the average three times as deep as Derwentwater or Bassenthwaite, shows clearly how the physical circumstances of the latter differ from those of all their neighbours.

The isobathic lines of Buttermere show that nearly two-thirds of the area of the lake has a depth exceeding 50 feet, and the shallower water is confined to the steep lateral slopes and the somewhat gentler but still steep terminal ramps. The lake, indeed, forms a simple trough with steeply sloping walls and a nearly flat floor. The deepest water, 94 feet, was found less than one-sixth of a mile from the head. The upper ramp, sloping from the floor to the head of the lake, was scarcely less steep than the sides, while the lower ramp sloped much more gently. Fig. 1 shows a section across the deepest part of the trough between the two constricting deltas of Comb Beck and Hassness How Beck. If the bed of the lake were dry, one would find, setting out from the delta of Comb Beck to walk across it, 270 feet of a slope of 1 in 3, leading to 600 feet of perfectly level plain, and that in turn giving place to 200 feet of a slope somewhat steeper than 1 in 3. The slope to the bottom of the trough is always steeper along the front of a delta, and in

one place it amounts to 1 in 2 as an average from the surface to the bottom. This is about the average slope of the lower part of the hill-sides round the lake, but it must be remembered that under water it occurs only off the edge of the flat meadow-like alluvial fans. The absolute flatness of the lake floor has no natural equivalent in sub-aërial scenery; a bowling-green, or, better, a brick-dust tennis-court, is the nearest analogue. In Buttermere, for example, there is a nearly rectangular plain, measuring 400 yards by 200 yards, the undulations on which nowhere exceed 4 feet, and that not in abrupt steps, but as a nearly uniform slope from one end to the other, the gradient being about 1 in 300.

Crummock Water is considerably larger than Buttermere, having an area of 0·97 square mile; a length of $2\frac{1}{2}$ miles, measured approximately along the axis; and consequently a mean breadth of 0·39 mile, or nearly 700 yards. Its whole drainage area is 17 square miles, or seventeen times the area of the water, but, including the Buttermere drainage, it is 22 square miles, almost equal to that of Coniston Water. The lake is slightly curved, the upper half-mile being continuous in direction with Buttermere, while the lower part runs more nearly north-north-west. At the curve the lake narrows to 500 yards between the rocky peninsula of Low Lingcrag and the cliff-bound Hause Point, but from here it continues to widen very gradually for a mile, when its breadth becomes 1000 yards. Thence it narrows slightly for a quarter of a mile, where the south end of the great Park Beck delta, abruptly projecting from the left shore, halves the breadth, and the lake tapers to a narrow outlet.

The main tributary is the river from Buttermere, which flows in at the south-western corner, and the Mill Beck runs in at the south-eastern angle. Three little islets lie near the shore at the head of the lake, but there are no islands of importance. Rannerdale Beck is the only important stream flowing in on the right shore; on the left shore, Scale Beck, on which there is a "force," or waterfall, visited by tourists, enters in two arms over an extensive delta near the head of the lake, while Park Beck carries in the drainage of Lowes Water close to the exit, entering at present over a small parasitic delta jutting from the side of the extensive alluvial plain. The altitude of the lake is about 321 feet.

Crummock Water was surveyed on October 30 and 31, 1893, when 18 sections were made of a total length of 7 miles, and including 166 soundings. These were about 24 to the lineal mile of section, or 171 to the square mile, the great simplicity of the structure of this basin making a comparatively small number of soundings sufficient to define it. From the contours the volume of contained water was calculated as 2,343,000,000 cubic feet, which gives an average depth of $87\frac{1}{2}$ feet.

The lake consists of one great flat-bottomed trough with steep sides, the right or eastern lateral slope down to the depth of 100 feet having an average gradient of about 1 in 3, while the left or western slope

averaged only about 1 in 5. Section 1, from Low Lingcrag to Hause Point, includes the two steepest lateral slopes of the lake, if not the steepest subaqueous slopes in the Lake District. At Hause Point, on the right, the cliff ran sheer down, 70 feet being found 8 feet off the rock, and the whole slope averaged 1 in 1, or an angle of 45°; while that on the opposite side was scarcely less, if we reckon from the depth of 25 feet instead of from the actual shore. Here in a total breadth of 500 yards there is a plain 300 yards wide with no diversities of level exceeding 5 feet, and averaging 130 feet below the surface. The slope of the sides at these points is as steep as any of the pre-

FIG. 9.—CRUMMOCK WATER, BANNERDALE, SHOWING DELTAIC FLAT FILLING A FORMER BAY. HAUSE POINT ON THE RIGHT.

(*Photograph by Mr. A. Pettitt, Keswick.*)

cipitous mountain cliffs which surround the lakes. Section 2 gives a view of the normal gradient of the lateral slopes about half a mile farther down the lake than Section 1, and passing through the deepest water found, 144 feet. More than half the area of the lake is covered by water exceeding 100 feet in depth, and 208 acres lie below 125 feet, forming a plain 1½ mile in length, the lowest part of which is only 19 feet deeper. The form is well brought out in the longitudinal section. From this flat plain the sides rise steeply—in some places they would be almost unclimbable if in the air—on both sides, at slopes averaging from 1 in 4 to 1 in 3, while at the head the ramp slopes gently up at

the gradient of 1 in 10, and at the mouth at the gentler gradient of 1 in 15.

This pair of basins, really one trough with the middle filled up (see the longitudinal section through both on Map IV.), shows almost all the typical characteristics of true alpine lakes. One interesting fact is that the ratio of the average to the maximum depth (61 per cent. for Crummock Water, 58 per cent. for Buttermere) is greater than for any other English lakes, or than the lakes of Geneva (50 per cent.), Garda, Como, Constance, Zürich, or Chiem (39 per cent. to 31 per cent.). They have thus, following Penck's morphometrical expression, an exceptionally pronounced chaldron structure.

VII. Ennerdale Water.

In Ennerdale Water (see Map IV.) we find the extreme example of a type of lake hinted at in Crummock, and the only pronounced specimen in the Lake District. The type is that of a narrow deep alpine lake, widening and growing shallower towards its outlet. It may be looked on as a transition between the shallow and deep types. Loch Lomond is the best example of this form in Great Britain, and the Lake of Garda on the continent of Europe. The area of Ennerdale Water is 1·12 square mile, and it is fed by a drainage area of 17 square miles, fifteen times the extent of the water surface. The length of the lake, the axis of which is straight and is directed to the west-north-west, is 2·4 miles, and its average breadth 0·46 mile, or 800 yards. The lake-shores are singularly unindented. For 1½ mile from its square-cut upper end the two coasts run parallel, giving the lake a nearly uniform breadth of 650 yards; then the right bank swerves to the right, and the left bank swerves to the left, giving to the lower end of the lake a nearly semicircular form, the straight left bank being the diameter, and the radius of this circle, corresponding to the maximum breadth, is 1000 yards. A small island lies in the middle of the lake, off the sudden curve of the left shore.

The valley of Ennerdale is exceptionally straight and of uniform slope, the land contour-lines up to 1250 feet running straight and parallel to the lake-shore along its whole length. The slopes of the hills along the north shore are slightly less steep, and in the east are cleft by a large gorge, from which the Smithy Beck descends to the north-east end of the lake, entering it near the place where the River Liza flows in from its long straight valley. The inflections in the lake-shore are defined by two precipitous crags—Bowness Knoll on the north, and Angler's Crag on the south.

The elevation of the lake is given on the Ordnance Survey maps as 369 feet; in 1864 it was fixed as 363 feet, and in June, 1894, as 367 feet. It may be taken as nearly 368 feet at the time of observation.

Mr. Heawood and Mr. Shields sounded it on October 25 and 26, 1893,

in unfavourable weather; but they succeeded in making 20 sections of a total length of 8½ miles, and including 218 soundings. The soundings were thus about 26 to the mile of section, or 194 to the square mile. The volume of the lake was found to be 1,978,000,000 cubic feet, somewhat less than Crummock, and the mean depth appeared to be 62 feet.

The lower half-mile of the lake, including most of the semicircular portion, was a shallow flat, averaging about 18 feet in depth, and the island was connected to the right shore by depths under 25 feet, that contour-line running only a small distance further down the lake. The upper part of the lake was entirely different, forming a single deep trough with steeply sloping sides and flat floor. The average steepness from the shore to a depth of 100 feet was 1 in 3 along the left or southern side, and 1 in 4 along the right or northern shore. The steepest gradients found were a little steeper than 1 in 2 from the shore to 125 feet at Angler's Crag, and 1 in 1·2 from the depth of 25 feet to 100 feet on the slope of the delta off the mouth of the main river as it enters. An indication is shown by the 25-foot contour-line of a former entrance of the river considerably to the south of the present one. The central plain is 1¼ mile long, and in places 500 yards wide at depths below 125 feet, the greatest depth on the plain being 148 feet near Angler's Crag. There are 163 acres below 125 feet.

Sections 1 and 2 are typical sections across the shallow lower end and the middle of the deep trough. The longitudinal section follows the axis of maximum depth in the deep part, but strikes straight across the shallow lower end.

In the case of this lake again, we find that the subaqueous slopes are quite comparable with those of the free hillside for steepness.

(*To be continued.*)

LIFE OF SIR SAMUEL BAKER.*—REVIEW.

By E. G. RAVENSTEIN.

Sir Samuel Baker has deserved well of geographers. A man of wide sympathies and varied activities, bold as a hunter, persevering as the founder of a European settlement in a tropical country, ardent in his patriotism, it is yet as a geographical explorer that Baker's name has enjoyed, and will enjoy among posterity, the greatest admiration, and it is as an explorer and geographer alone that we have to deal with him in these pages.

When Baker first turned his attention to African exploration, he was already a man of forty years of age, for he was born in 1821, and it

* 'Sir Samuel Baker:' A Memoir by T. Douglas Murray and A. Silva White. Maps and Portraits. Macmillan & Co.

was only in 1861 that he "determined to commence an expedition to discover the sources of the Nile, with the hope of meeting the East African expedition under Captains Speke and Grant somewhere about the Victoria Lake." The authors, on entering upon the subject of the Nile, introduce a sketch of previous Nilotic exploration, with reference to which it may be stated that, long before the days of Delisle and D'Anville, a few geographers had recognized the fact that the lakes and intricate rivers occupying on our maps the whole of Southern Africa were mere figments of imagination, or the doubles of Abyssinian lakes; that it was Michael Hey, the companion of Rüppell, who first among Europeans sailed up the Bahr el Abiad; and that Petherick never reached the low latitude claimed by him. Miani, too, who cut his name in a tree (33° 35′ N.), subsequently discovered by Speke, might have been mentioned.

When Baker entered upon the path of an African explorer, the opportunities for gaining distinction by making discoveries of importance, such as would strike the imagination of the public, and effect changes in our maps visible even to the least observant of observers, were much greater than they are now. As Speke was not expected to reach the Upper Nile before the beginning of 1863, Baker spent the interval allowed him in making an experimental trip, which would serve him as a training, and make him thoroughly acquainted with the language and character of the people, upon whom his success in future would be mainly dependent. He acquired, too, the use of astronomical instruments, which enabled him subsequently to lay down his routes with satisfactory accuracy. In this he acted wisely. He chose for the field of his experience the wide steppe region which extends from Berber and Khartum, across the Atbara, and to the foot of the Abyssinian highlands, which possessed in his eyes the additional advantage of being a very sportsman's paradise. On this occasion, as well as subsequently, he was accompanied by his heroic wife, whose benign influence can be traced in many a passage of Baker's books of travels.

On December 18, 1862, Baker left Khartum for the Upper Nile, not by any means attended by the good wishes of the people, nor even of the Egyptian officials, who not unnaturally looked upon this intruder as one likely to interfere with the slave-trade, which was yielding them large profits. It is well known that Baker met Speke and Grant at Gondokoro on February 15, 1863, anticipating Petherick's relief expedition by five days.

While the successful "settlers of the Head of the Nile" sailed away in Baker's boats to Khartum, Baker himself started in quest of a reported lake, which constitutes an important feature in the Nilotic system, although reported to be much smaller than the Victoria Nyanza. By a circuitous route, which led through the country of the Latuka, an interesting tribe whose language is akin to that of the Masai, surmounting the obstacles placed in his way by the leaders of slave-caravans,

and breaking the mutinous spirit of his own men, Baker at length reached the Somerset Nile near the Karuma falls. Crossing Unyoro, he looked down upon the sought-for lake, weary and toil-worn, but sustained by the quenchless enthusiasm that had carried them to the goal of their ambition. This was on March 14, 1864, in lat. 1° 14′ S. The authors very fully discuss the geographical results of this important journey, not inappropriately referred to as the "crowning achievement" of Baker's life. And here, once more, it is proved that we cannot always trust the evidence of our own eyes. Baker, who stood close to the southern extremity of the lake, conceived that it extended for 200 miles to the southward, or to about 1° S. lat. And Baker obstinately adhered to his view, even after Colonel Mason had made a survey of the lake; and as recently as 1878 he wrote to Mr. H. M. Stanley that the "Beatrice gulf [now merged in Albert Edward Nyanza] is, of course, a portion of the Albert." Thus do we cling to the delusions of our youth!

After a prolonged stay in England (1865–69), in the course of which Baker's services to geography were fully recognized, he accepted the lead of an expedition expressly fitted out for the suppression of the slave-hunters, and the establishment of legitimate commerce in the regions of the Upper Nile. The work attempted by Baker during these four years of hardship is ably set forth under the appropriate heading of "The Task of Sisyphus." Baker himself recognized the fact that he had not gone the right way to work, in order to effect any permanent results. "Measures of forcible repression were all very well for punitive or police purposes, but they did not strike at the root of the mischief; they simply lopped off vicious excrescences, and left the main supports untouched." These errors of judgment, however, might have been repaired by Baker himself, or his successors, had he enjoyed the support of a strong Government, really in earnest. Baker, at all events, had driven off the slave-hunters, and "had planted in the countries annexed to Egypt the rudimentary structure of an administration, which had for its object the creation of law and order, of legitimate commerce, and of havens of refuge against slave-hunters."

The authors must be congratulated upon the impartial manner in which they have sought to perform the task of writing the life of a deservedly popular Englishman. They have given us more than a mere biography, for they have enabled us to form a true estimate of their hero by showing us the environment which impelled his thoughts and actions. Their book is, indeed, one which persons interested in the true welfare of Africa will do well to study. Perhaps, too, it may again direct attention to Baker's great works of African travel—'The Nile Tributaries of Abyssinia,' 'The Albert Nyanza,' and 'Ismailia.'

THE MONTHLY RECORD.

THE SOCIETY.

The International Geographical Congress. — The Sixth International Geographical Congress will be opened on the evening of Friday, July 26, by H.R.H. the Duke of York, in the Great Hall of the Imperial Institute. Up till that day the head-quarters of the Congress and the office for issuing tickets will remain in the house of the Royal Geographical Society, 1, Savile Row. The preliminary programme for the Congress provides for a general meeting of all the members each morning, when papers of general interest will be read and discussed. In the afternoon the Congress will as a rule meet in two sections, the subjects to be considered in each being so selected as to attract different groups of specialists. Subjoined is a skeleton programme which, when filled up, will probably form a fair forecast of the arrangements for the meeting. A detailed programme will be ready before the opening day, and a special *Journal* will be issued every morning during the meeting, giving full particulars of the work for the day, and a concise report of the previous day's proceedings. The provisional programme is as follows:—

Friday, July 26.—The Congress will be opened in the Great Hall of the Imperial Institute at 9 p.m., when short addresses of welcome will be delivered by H.R.H. the Duke of York, Honorary President, and by Mr. Clements R. Markham, President. A Conversazione in the rooms and gardens of the Imperial Institute will follow. *Saturday, July* 27.—Mr. Markham will deliver his Inaugural Address in the Great Hall at 10 a.m., after which the Congress will meet in two sections to discuss papers on "Geographical Education," by Professors Levasseur and Lehmann and others, and on "Mathematical Geography," especially the use of photography in surveying, by Colonel Laussedat, Colonel Tanner, and others. *Monday, July* 29.—A general meeting of the Congress will discuss the subject of "Arctic and Antarctic Exploration," introduced by Professor Neumayer and Admiral A. H. Markham. In the afternoon two sections will be formed, in one of which questions in "Geodesy" will be treated by General Walker and M. Lallemand, while in the other, papers will be read, amongst others, by Prince Roland Bonaparte on "Glaciers," and M. Martel on "Spelæology." *Tuesday, July* 30.—Report of Committees and papers on the proposed "Map of the World" on the scale of 1:1,000,000, and on "International Geographical Bibliography," will be presented at the General Meeting, and two sections will then deal with "Oceanography," introduced by Mr. J. Y. Buchanan, and with the "Orthography of Place-names," introduced by Mr. G. G. Chisholm and Dr. Burgess. *Wednesday, July* 31.—Sir John Kirk will initiate a discussion on "Europeans in Africa" in the General Meeting; and in the afternoon the sections will consider "Applied Geography" (Commercial Geography) and "Limnology," the latter to be introduced by Professor Forel. *Thursday, August* 1.—The General Meeting will deal with the "Terminology of Land Forms," and in the afternoon "Cartography" and other subjects will be treated. *Friday, August* 2.—The forenoon will be devoted to papers by Baron Nordenskiöld, Professor Hermann Wagner, and others, on the "History of Maps;" and all the remaining papers will be taken in the afternoon. *Saturday, August* 3.—The votes proposed for consideration will probably be discussed, the date and place of meeting of the next Congress considered, and the President will deliver his concluding address.

Delegates to the Congress have been appointed by the governments of more than twenty countries and colonies, and by more than sixty geographical and scientific societies in all parts of the world. Early applications for tickets should be made. Full particulars of the receptions and other entertainments which have been arranged may be obtained at the Office of the Congress, 1, Savile Row.

Geography at Owens College.—The following report from Mr. A. J. Herbertson, Lecturer in Geography at Owens College, Manchester, has been received too late to find a place along with the reports from Oxford and Cambridge. During the past year the following courses of lectures were delivered at Owens College, Manchester, by the Lecturer in Geography:—A course on *Cartography* during the Michaelmas Term, and one on the *General Geography of Europe* during the Easter Term. An attempt was made to do some practical field-work in connection with the cartography lectures; but the students, who numbered twenty, were all in the Training College, and had no time for more than one demonstration. It is, perhaps, desirable to point out how that the present regulations for Training College students compel those who have not exhibited special merit in geography in the Queen's Scholarship examination to take this subject; and they allow the distinguished students, who, presumably, have been most interested in the subject, and are best qualified to profit by University lectures, to set it aside, which they usually do, as the subject is not recognized by the University as an optional one for any degree. An evening course on the *Principles of Commercial Geography* was announced for the Michaelmas Term, but the necessary number of students did not enroll. The Manchester Geographical Society have kindly offered their room for the evening classes next winter, and the College authorities have agreed that these classes should be held there, in a more central position, where no deterrent restrictions need be applied. The geographical materials at the Owens College are very scanty; but a grant of £20, voted to the Geographical Department by the College, has been spent in buying a few of the absolutely necessary standard books and maps. In conclusion, the lecturer would thank the College authorities and the Manchester Geographical Society for the way in which they have aided him in carrying on his work.

The Society's Conversazione.—On the evening of the Anniversary of the Society, May 27, the President and Council received the Fellows of the Society and their friends at a Conversazione in the Princes Hall and the rooms of the Society of Painters in Water Colours. The guests were received by Mr. and Mrs. Markham. There was an exhibition of Franklin pictures and relics, of some of the paintings made by Mr. Stokes while with Lieutenant Peary, of maps, photographs, and other objects. About 1300 of the Fellows and their friends availed themselves of the invitation.

EUROPE.

The Earthquake at Laibach.—The great earthquake on the night of April 14 to 15, which extended over the greater part of Austria-Hungary, was felt in its fullest intensity at Laibach, the capital of Carniola, a flourishing town of some 30,000 inhabitants. The earthquake began at 11.20 p.m. with three severe shocks following one another at intervals of about half a second, and lasting altogether fifteen seconds. Twenty-five more or less violent disturbances occurred before seven o'clock next morning, and during the following day the intensity greatly diminished, although up to the present (beginning of May) occasional vibrations are still perceptible. Many people suffered severely in the sudden nocturnal flight from the town, but there were, fortunately, few fatal accidents. Nine-tenths of the buildings in Laibach have suffered—two-tenths to such an extent as to require rebuilding; and the total damage is estimated at four millions of florins. The region of greatest intensity of disturbance is apparently not represented by a circular or elliptical tract, as would be the case if the shocks had originated from a central point. One is rather led to assume the existence of several *lines of impact*, as destructive effects were experienced at Trieste, at Goritz, at Villach in Carinthia, at Cilli in Lower Styria, in Croatia, and at Fiume, while the grotto of Adelsberg and the mercury mines of Idria, situated between some of these points, escaped. Further, shocks were experienced almost simultaneously in widely separated districts. Beyond the more intense area, less violent shocks were felt at Vienna, in Upper Austria, at Salzburg, in Eastern and Southern Tyrol, the north of Italy as far as Pavia, beyond the Appennines to Florence, and south to Macerata beyond Ancona; and on the other side of the Adriatic, in the south-western part of Hungary, in Croatia, Bosnia, and Dalmatia. The area of perceptible shocks was, therefore, at least 58,000 square miles, equal to that of England and Wales. At Grenoble, a seismometer gave distinct records of vibrations at about the same time. Professor Hoernes, of Gratz, and Drs. Suess and Toula agree in regarding the Laibach earthquake as one of the so-called "tectonic" disturbances common in areas of subsidence and in mountain ranges, caused chiefly by vertical or horizontal dislocation of the subsiding rocks; and it is remarkable that a certain church standing on a hilltop is now visible from at least one point where the view was formerly blocked by the intervening country, a rough calculation by Professor Penck showing that vertical displacements amounting to over 30 feet must have occurred. It is as yet uncertain whether the Laibach earthquake is connected with the recent inroads of the Adriatic, or occurred along the dislocation line of the Save valley like the Agram earthquake of 1880. Dr. Franz Suess, who has been ordered by government to report upon the earthquake, says that from a preliminary examination it appears that the chief movement was transverse, in a north-westerly direction, with a considerable vertical component. More detailed information may be looked for shortly.

ASIA.

Progress of Dr. Sven Hedin in Central Asia.—In a letter to M. Petrovsky, dated "Saïlik, March 5, 1895," which has been kindly forwarded for our perusal by General Venukoff, Dr. Sven Hedin gives some account of his proceedings in Central Asia in the early part of the current year. On February 24 he had made an excursion to the Yarkand-daria, which he describes as an imposing stream even in the dry season, flowing at the spot visited in a single bed, having then a width of 200 feet, with a maximum depth of 6. There was no ice in it at the time, though some had been seen at no great distance on the road to Maralbashi. The stream is generally wide and divided into several arms, and, according to all accounts, must attain a vast size in the month of June. The passage is effected at various points

by means of large boats. On the 25th a start was made with two men for Terem, a large settlement which, with the village Mogal in the vicinity, is said to number four hundred houses. It has a bazaar and three Chinese officials. There is but a narrow fringe of vegetation along the Yarkand-daria, the rest of the country being arid. Further on to the south-west is a marshy country with the saline lake Bai-shan-kul, fed from Yangi-hissar. The sand becomes more continuous, but is not of the kind known as *zor-kum* until close to Urdan-Padishah. Here there were some *imams* and other religious persons, and fifty pilgrims from the villages to the north were met with. The offerings of the pilgrims are thrown into a large *kasan*, the gift of Urdan-Padishah, and go to support the religious employés. The village will soon be buried by a moving sandhill, which has already swallowed up several houses. The *masar* proper is at a little distance from the village. The position assigned to the place on our maps, due probably to Bellew, is not nearly far enough to the south-west, though his description seems accurate. On the 27th Dr. Hedin proceeded northwards to Atjik, a considerable settlement in a marshy neighbourhood on the road to Shan-arik and Kashgar. Returning thence to Terem, he proceeded through an excessively barren country to Terek-lenguer, and thence back to Lailik along the course of the Yarkand-daria. During this trip no archæological remains were discovered, but rather those relating to the hydrography. The Yarkand-daria is shifting its course eastwards, for between Terem and Urdan-Padishah, and between Terem and Terek-lenguer there are several ancient channels. There are, besides, numberless swamps along the left bank, where the water still remains in the ancient beds. Between Lailik and the river there is alluvium, but none on the other bank, while at Terek-lenguer the inhabitants reported that the cultivated ground was gaining in extent. Other old channels and former streams are also spoken of north and north-west of Terem. While resting at Lailik, the traveller was unfortunately prevented from taking astronomical observations by the immense amount of dust in the atmosphere. One of his men had effected satisfactory purchases of necessaries for the journey at Yarkand, and only camels were wanting for the passage of the *Takla-makan*. The intended route was to lead east-north-east to the Mazar-tag, along which Dr. Hedin proposed to proceed to the Khotan-daria. Water and provisions for twenty-five days would be taken; but vegetation and water would probably be found *en route*, especially near the Mazar-tag. In a postscript dated "Merket (opposite to Lailik), March 18," Dr. Hedin refers to the ruins scattered over the country, which are said to occur almost all the way from Maralbashi to Ush-Turfan. He had been unwilling to delay for their examination, for fear of missing the proper season for the passage of the desert, but had determined to visit them on his return. Ruins were said to have been discovered by chance, some years ago, not far from Lailik; but the offer of a reward failed to elicit information as to their locality, and the traveller was beginning to think that the chief of the ruins existed only in the imagination of the inhabitants. At the time of writing he had succeeded in purchasing eight camels; but his servant was about to leave him just when the difficulties were beginning.*

Indian Marine Surveys, 1894–95.—During the recently concluded working season an important coast survey in the extreme north-west of India has been carried out by the Royal Indian Marine ship *Investigator*, which, with her tender the *Nancowry*, returned to Bombay on May 6. It was in October last year that the

* An interesting account has been received at the Society from Dr. Sven Hedin of his ascent of the Mustagh-Ata, which has to be held over owing to pressure on the space of the *Journal*.

vessels had left Bombay for Kurrachee, and carried on work south-eastward along the delta of the Indus as far as the principal or Hajamro mouth of the river. The last survey of the coast was made in 1850, and, as is well known, the soundings undergo such great changes owing to the influence of the river that an accurate chart will be much appreciated by navigators. Both the vessels were in Kurrachee harbour in November last when the Viceroy visited the port, and his Excellency was shown all the latest improvements in the machinery and apparatus for obtaining deep-sea soundings and trawling for deep-sea *fauna*, as well as the charts plotted by the officers of the *Investigator*. The two vessels, after spending Christmas at Kurrachee, then proceeded to Palk Strait to examine anew that old problem, the feasibility of a ship channel for large craft between India and Ceylon. The result coincided in the main with that of previous examinations, *i.e.* that no greater depth than 5½ fathoms could be relied upon, a depth which shipmasters would probably consider too risky, even with the prospect of saving from 200 to 300 miles in route. It is curious to read, in one of the Indian papers, that the officers of the *Investigator*, who, when visiting remote localities, are often at some difficulty to obtain fresh provisions, were refused permission by the authorities of the Indian district at Point Calimere to land or shoot in the neighbourhood, though they were granted every assistance by the Ceylon government officials on the other side of the strait. In the domain of natural history, a large harvest of specimens has been obtained by the scientific staff of the *Investigator*, and deposited in the Calcutta museum.

Indian Railways.—The "Administration Report on the Railways in India for 1893–94," by Lieut.-Colonel W. S. S. Bisset, C.I.E., R.E. (Parliamentary Blue Book, C. 7453, 1884), gives important information as usual regarding the progress of railway enterprise in India. The total mileage open on March 31, 1894, was 18,500, of which 451¾ miles were opened during the year under review, among the more important of these works being the first section of the East Coast (State) Railway, from Bezvada to the south bank of the Godavari, which is now being worked by State agency along with the Rajahmundry-Vizianagram section and the Coconada and Vizagapatam branches, which were completed and opened for public traffic on August 21, 1893. The standard-gauge line from Lucknow to Rae Bareli, a distance of 48½ miles, was also opened for public traffic. Automatic vacuum brakes were brought into use on the mail trains of the East Indian Railway, and an accelerated mail service was introduced. Pintsch's system of lighting carriages with gas was also adopted on the mail train, while the same system was sanctioned for the Great Indian Peninsula, the Bombay, the Baroda and Central India, and the Madras railways, and its introduction on State lines was decided on. The total capital expenditure on all railways up to December 31, 1893, amounted to 240.90 crores of rupees, of which 181.52 crores related to the standard gauge. The average cost per mile of railway open was 160,971 rupees for the standard gauge, and 70,584 rupees for the metre gauge. There was a substantial increase of 85 lakhs in the gross earnings of 1893, as compared with the figures of 1892, and of 41 lakhs on the net earnings, while the statistical return on the capital expenditure on open lines, including steamboat service and suspense accounts, was, for the year 1893, 5·46 per cent. as compared with 5·42 for the year 1892, a result which contrasts very favourably with the figures furnished by the experience of most other countries.

AFRICA.

The District of Dar-al-Baida, Morocco.—Some interesting notes regarding the present commercial condition of the district of Dar-al-Baida are given in a recent Consular Report (Foreign Office, 1894, Annual Series, No. 1473). The Report deals separately with the ports of Dar-al-Baida, Mazagan, Saffi, and

Mogador. Mogador is of great importance commercially, being the principal seaport for the southern trade of Morocco. For a distance of some 200 miles inland the tribes of Berbers and nomad Arabs are mainly dependent on Mogador for their supplies of such commodities as calico, manufactured and bar iron, sugar, coffee, spices, and green tea, while the almonds of the Atlas and Sus, the wool of Wadnun, and the gums and ostrich-feathers of the Moorish Sudan are brought here for shipment. A considerable trade is still carried on with the city of Morocco, about 120 miles nearly due east of Mogador. The district is chiefly interesting as a tree-growing and pasture country. It is especially suitable for goat and, to some extent, sheep farming. Extensive pasture and arable lands stretch from Mogador eastward to Morocco city, and in a southerly and south-easterly direction to the spurs of the Atlas, capable of producing in normal years abundant crops of cereals. Owing to the uncertain rainfall, the smallest stream is of the utmost importance for irrigation purposes. The privilege of irrigation is in some districts, notably in Sus, purchased at very high prices. The great superiority of river over any other plantations is especially pointed out. On the flats frequently formed by the overflowing of rivers, as in many parts of the Sheshowa, Mafis, Assifelmal, and other tributaries of the Tensift, are found the finest plantations of olive, almond, date-palm, orange, fig, and other fruit trees of especial value to Southern Morocco.

POLAR REGIONS.

The Relief of Lieutenant Peary.—The sealing steamer *Kite*, of St. John's, Newfoundland, has been chartered to proceed to Inglefield Gulf, North Greenland, to bring back Lieutenant Peary. The *Kite* sailed from St. John's on June 22, direct for Inglefield Gulf.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

The Hydrography of the Sea of Marmora.—In continuation of the work of the *Pola* in the eastern Mediterranean and the Ægean Sea, Dr. Konrad Natterer made some deep soundings in the Sea of Marmora on board S.M.S. *Taunus* during May, 1894, and the results will shortly be published by the Vienna Academy of Sciences. It appears that the usual assumption, based on a knowledge of the prevailing currents, to the effect that the surface layers of water in the Sea of Marmora are very much fresher than the under layers, is not altogether justified, the difference being even less than is found in the Black Sea. None of the water samples examined contained sulphuretted hydrogen, and no sulphide of iron was detected in the bottom samples even in a new sounding of 746 fathoms, 100 fathoms greater than had hitherto been obtained. The amount of dead organic matter is much greater in the Sea of Marmora than in the eastern Mediterranean, and to this fact Natterer ascribes the greatly increased opacity of the water: that Constantinople is not the cause appears from the observation that the eastern and western portions of the sea are equally impure. The putrefaction of the organic matter occurs in the first place through the oxidation of the albuminous parts of the floating particles; and from their relatively large quantity so much carbonic acid is set free, that, instead of the usual alkaline reaction, the waters of the Sea of Marmora give characteristic reactions of carbonic acid. One important result of this peculiarity is, that in the Sea of Marmora a constant dissolving process is going on, instead of, as in the eastern Mediterranean and the Ægean, constant chemical precipitation. Natterer points out the marked influence of this process of solution in deepening the basin of the Sea of Marmora, particularly where, as often happens, the submarine cliffs are precipitous: land-slips stir up the bottom mud, which is then removed by the

currents. Further chemical and physical evidence shows the existence of ascending and descending currents, and it seems reasonable to suppose that not only here, but in the oceans generally, the nitrous and carbonic acids formed in the depths provide nourishment for the plant-life growing in the sunlight at the surface. Natterer finds very complete mixture of the waters throughout the whole of the Sea of Marmora, and concludes that the surface current from the Black Sea and the bottom current from the Mediterranean give rise to a cyclonic circulation of the nature already suggested by his work in parts of the Mediterranean. Chemical observations show that the sinking down of surface water is most marked in the central and deepest parts of the Sea of Marmora, and the average specific gravity from surface to bottom is less there than near the coasts. If we suppose a condition of hydrostatic and not hydro-dynamic equilibrium to exist, the level of the water surface at the centre of the Sea of Marmora must be some 20 feet higher than at the coasts. The active vertical circulation produces a remarkable effect in the distribution of temperature, the mean temperature near the bottom being almost exactly the mean temperature of the air at stations round the coasts. The Sea of Marmora resembles in many ways an inland lake, through which a large river is flowing, and the absence of detritus brought down by the stream makes it an exceptionally good field for the chemical study of the circulation in all the complex modifications produced by the varied relief of the bottom.

The Sonnblick Observatory.—A general meeting of the Sonnblick-Verein was held on April 6 of this year. The President, Colonel Edler von Obermayer, was able to report an increase in the number of members, but urged the necessity of obtaining still wider support in the future. A paper on the scientific results of the Sonnblick observations up to the present time was read by Dr. W. Trabert. First must be placed the startling result reached by Hann, chiefly from a discussion of the Sonnblick observations, that the central column of air in a cyclonic system does not ascend by reason of relatively higher temperature, being, in fact, colder than the air surrounding it; nor does the air in the descending current of an anti-cyclone attain its greater relative density by reason of lower temperature. This conclusion produced almost a revolution in the domain of dynamical meteorology, as it was practically a death-blow to what was known as the convectional theory of cyclones. Dr. Trabert gave an account of some researches made by himself on the warming of the air by direct absorption of the sun's heat at a mountain summit. The results, which have already been published in full, show that, as at lower levels, the air is chiefly warmed by convection from the Earth's surface. Hann has further succeeded in estimating the daily range of temperature in the free air not affected by ascending and descending currents from mountains—an investigation which was always supposed to involve observations from balloons. In a zone such as that between the summits of the Sonnblick and Mont Blanc, the daily range was found to amount to only 1° C. Hann further points out that the Sonnblick observations agree with those of other mountain stations in throwing considerable doubt on current theories explaining variations of wind velocity. Investigations more in the domain of pure physics have been made by Elster and Geitel, on the nature of St. Elmo's fire, the atmospheric absorption of the ultra-violet rays, etc. Trabert and Pernter are at present engaged in an extensive work dealing with the general geographical relations of the results just enumerated.

Physical Geography.—Professor W. M. Davis, whose remarkable treatise on some English rivers was recently published in the *Journal*, has undertaken to contribute a series of "Current Notes on Physiography" to the American weekly *Science*, which was resuscitated at the beginning of this year. In the first instalment he dwelt very strongly on the importance of the geographical education of

topographers, pointing out that much of the detail of all maps must be sketched in by the eye, and that an eye trained to appreciate geographical forms is the only guarantee of accuracy and excellence in the minor details of a map. He pleads strongly the importance of full University recognition of geography, with special reference to this application. The notes appear every few weeks, and deal mainly with American work, giving a sketch of the progress now being made in the study of physical geography in the United States.

OBITUARY.

Hugh F. C. Cleghorn, M.D., LL.D., F.R.S.E.

Dr. Hugh Cleghorn, who had been a Fellow of the Royal Geographical Society for thirty years, died at his estate of Stravithie, in Fifeshire, on May 17, aged seventy-four. He was born at Madras in 1820, and educated at Edinburgh and St. Andrews. He graduated as M.D. in 1841, and went out to India, where, while attached to the Madras General Hospital, he found much time to devote to his favourite study, botany. While in England in 1851, he took part in cataloguing the raw products shown in the great Exhibition, and on returning to India he was entrusted with the task of organizing a Forest Department in Madras, with the special object of checking the reckless system of cultivation then prevalent. After studying the forests of all parts of India, he elaborated a scheme, which ultimately grew into the present Forest Department of India. Jointly with Sir Dietrich Brandis, he was the first Commissioner for the Conservancy of Forests, and later he became Inspector-General of Forests. Dr. Cleghorn retired and left India in 1869, living for the most part the quiet life of a country gentleman at Stravithie, although he never ceased to do all in his power for the promotion of arboriculture and botany in this country. On one occasion he took the place of the Professor of Botany at Glasgow for a session, and he also acted as Examiner in Botany for medical and science degrees at Edinburgh University. His sympathetic manner as an examiner endeared him to the students who passed under his criticism, and the gentle courtesy which distinguished him through his whole life drew towards him the affection of his contemporaries, and especially of his subordinates, to a degree rare in public men. Dr. Cleghorn was instrumental in securing the establishment of a Lectureship of Forestry in Edinburgh University, which it was his aim to develop into a full Professorship.

William Alfred Eckersley.

This promising young Fellow of the Society, whose death has recently taken place, was born at Silverdale, near Lancaster, on January 25, 1856. He was educated at Marlborough School, and at Pembroke College, Oxford. On leaving Oxford he served a pupilage as engineer of three years (1874–1877) to his father, Mr. W. Eckersley, M.I.C.E. From 1879 to 1882 he had charge, first, of river protection works on the Thames, and, secondly, of the construction of a sea-wall and land-reclamation works at Trouville-sur-Mer, France.

From 1882 to 1886 he was engaged in the location, and had charge of a section under construction of the Jerez-Algeziras Gibraltar railway. From 1886 to 1892 he was engaged in railway construction and inspection in various parts of the world.

In April, 1893, he sailed to South Africa to report on the proposed extension of a railway from Fontesvilla to Salisbury in the British South African Company's

possessions. He was commissioned by Messrs. James Livesey & Son to survey and superintend the whole of this business. He returned home at the end of 1893. A very interesting paper by Mr. Eckersley appears in the *Geographical Journal* of January, 1895, called "Notes in Eastern Mashonaland," which gives an account of his work in connection with this survey. In August, 1894, he went out to Salvador to report on the railway in this Central American republic, and he had also to survey the projected extensions between a station on the Santa Ana railway now in construction, and the town of San Salvador, the capital of the republic. It was during the discharge of his duties that he contracted the fatal illness, terminating in yellow fever, which ended his valuable life. Leave had been granted him for a brief holiday in England, and he was to have sailed on April 28, five days after his death. Mr. Eckersley married Miss Rachel Huxley in 1885, by whom he had three children.

Obituary of the Year.

The following is a list of the Fellows of the Society who have died during the year 1894–95 (May 13):—

The Right Hon. Lord Aberdare; E. C. Adams; G. A. Anstey; George Arbuthnot; Rev. Brymer Belcher; Richard Blanchard; Rev. W. J. Bowden; W. J. Browne; Sir E. H. Bunbury; S. M. Burroughs; H. T. Caine; Robert Campbell; W. W. Cargill; R. T. Cocks (late Treasurer of the Society); the Right Hon. Lord Coleridge; Sir William Collins; F. H. Copland-Crawford; General R. F. Copland-Crawford; Charles Cory; Sir J. C. Cowell; F. J. Crocker; Professor J. D. Dana; Wm. A. Fenner; Hon. C. W. Fitzwilliam; General J. E. Gastrell; Alfred Gillett; Sir C. C. Graham; Colonel W. Gray; E. Haldane; Rev. Edwd. Hale; W. Edwd. Hall; Colonel Charles Harding; Joseph Hargrave; General Sir J. S. Hawkins; John Henderson; A. R. Hollebone; Hugh Hughes; W. L. Hunter; Rev. C. E. Ingham; Admiral Sir Edward A. Inglefield; H. H. Ismail Pacha (Ex-Khedive of Egypt); T. M. Rymer Jones; Sir D. A. Lange; Right Hon. Sir Austen H. Layard; C. R. Lindsay; S. P. Low; W. C. M. Macdonald; A. J. Marshall; Colonel Sir G. Maude; John Maxwell; Robert McIlwraith; Thomas B. Muggeridge; Major W. G. Murray; W. Shore Nightingale; Baron de Overbeck; H. R. H. le Comte de Paris; Sir Robert Peel; C. B. Phillimore; Colonel J. Puget; Major-General Sir Henry C. Rawlinson; Brig.-Surg. W. Robertson; John Rogerson; Captain D. G. Sandeman; Samuel Sanders; C. K. Sharp; Henry P. Sharp; General Philip Smith; W. J. Steains; H. S. Stower; G. H. Strutt; Colonel S. W. Stuart; Courtenay Tagart; George Tinline; F. Tooth; P. D. Tuckett; Captain A. W. Twyford; George Tyler; Colonel A. D. Vanrenen; Professor Veth; Anthony Walter; E. H. Watts; Robert White; E. C. Williams; Admiral Thomas Wilson.

MEETINGS OF THE ROYAL GEOGRAPHICAL SOCIETY, SESSION 1894–95.

Anniversary Meeting, May 27, 1895.—Clements R. Markham, Esq., C.B., F.R.S., President, in the Chair.

At the commencement of the proceedings the Honorary Secretary (Mr. H. Seebohm) read the rules, which govern the business of the meeting.

The President next appointed Mr. Hugh Leonard and Captain Henderson Smith scrutineers for the ballot about to take place.

ELECTIONS.—*Samuel S. Allen, B.A.; Tempest Anderson, M.D., etc.; Sir George Baden-Powell, K.C.M.G., M.P.; Luke Bishop; Captain A. M. Boisregon; John Carder; C. W. Cayzer, M.P.; Leonard Cooper; W. H. Crosse; George Gough Dixon; Christopher T. Elmslie; Lieut. Arthur Henry Stuart Elwes, R.N. (retired); C. W. Gallwey; Francis Edward Halsey; C. E. Harrison; Plantagenet Charles Martell; Ernest George Mayse; Captain Chas. L. Morris-Newman; Arnold Pike; Don Frederico Pezet; D. W. Prowse; Bernard Alfred Quaritch; Thomas Godolphin Rooper; Rev. Graham Sandberg; H. L. Searle; Edwin Speight; Isaac Edwin Segmann; John Warren.*

The Annual Report of the Council was then read.

REPORT OF THE COUNCIL.

The Council have the pleasure of submitting to the Fellows the following Report on the general and financial condition of the Society:—

Membership.—The number of Fellows elected during the year ending May 13, 1895, was 207, and three Honorary Corresponding Members. In the previous year, 1893–94, the total elections amounted to 240, and in 1892–93 the number was 348. Our losses have been, by death 80 (besides 1 Honorary and 3 Honorary Corresponding Members), by resignation 62, and by removal on account of arrears of subscription 52; making a total increase of membership for the year of 12. In the year 1893–94 there was an increase of 29, in 1892–93 an increase of 166, in 1891–92 a decrease of 23. The total number of Fellows on the list (which does not include those (50) who have been elected but have not yet paid the fees, and exclusive of Honorary and Honorary Corresponding Members) on May 13 was 3703.*

Finance.—As will be seen by the annexed Balance Sheet, the total net income for the Financial year ending December 31, 1894 (*i.e.* exclusive of balance in hand and sale of Stock), was 9853*l.* 4*s.* 6*d.*, of which 6852*l.* 10*s.* consisted of entrance fees and subscriptions of Fellows. In the previous year, 1893, the total net income was 11,050*l.* 2*s.* 1*d.*, and the amount of subscriptions, etc., 7458*l.* 10*s.*; in 1892, the two totals were 9299*l.* 18*s.* 7*d.* and 7007*l.* respectively.

The net expenditure for the past year (*i.e.* exclusive of balance in hand and alterations to premises) was 9583*l.* 0*s.* 5½*d.* The net expenditure in 1893 was 11,584*l.* 2*s.* 3*d.*; in 1892, 9012*l.* 7*s.* 5½*d.*

The Finance Committee of the Council have held, as usual, meetings during the year, supervising the accounts of the Society. The Annual Audit was held on April 25 last, the Auditors being, on behalf of the Council, Sir Rawson W. Rawson and Howard Saunders, Esq., and on behalf of the Fellows at large, E. O. Tudor, Esq., and J. Duncan Thomson, Esq. The cordial thanks of the Council and Fellows are due to these gentlemen for having freely devoted their valuable time to this important task. At the end of their labours the Auditors drew up the following Report to the Council:—

Auditors' Report.—"The Auditors appointed to examine the Accounts of the Royal Geographical Society for the year ended December 31, 1894, have examined the Balance Sheet presented to them, and have compared it with the Books and Vouchers. They have found it correctly stated and sufficiently vouched. The Books have been kept and the Accounts rendered in the usual satisfactory manner.

"The gross receipts of last year amounted to 11,357*l.*, and the gross expenditure to 11,061*l.*; but these figures included a sale of Stock yielding 1500*l.*, and an

* It will be observed that the elections are given for the year ending May 13, the accounts for the year ending December 31.

expenditure on alterations to the House, including an introduction of the Electric Light throughout the building, amounting to 1478*l.* Deducting these extraordinary items and the balances, the net ordinary receipts of the year amounted to 9853*l.*, and the net ordinary expenditure to 9583*l.* The year began with a balance of 3*l.* 18*s.* 2½*d.*, and closed with one of 295*l.* 10*s.*

"The Auditors abstain from the usual comparison of the figures of 1894 with those for the year immediately preceding, because, as was pointed out in the Auditors' Report for last year, the receipts and expenditure of 1893 were abnormally increased—on the one side by the legacy of 1000*l.* from the late Earl of Derby, a large sale of Stock, and a modification of the Rules relating to Life Compositions; and on the other side by a correspondingly large purchase of Stock and several unusually heavy items of expenditure. But a comparison with the last normal year, 1892, shows satisfactory results, and a return to a normal condition of finance. In 1892, the net receipts, excluding balance on January 1, were 9300*l.*, and the expenditure 9012*l.*, leaving a balance of 288*l.*; in 1894, the corresponding receipts were 9853*l.*, an increase of 583*l.*, and the expenditure was 9583*l.*, leaving a balance of 295*l.*

"With regard to the receipts of last year, it is satisfactory to notice that while the Life Compositions fell off by 600*l.*, the Annual Subscriptions, which are the main support of the Society, increased by 316*l.*, and that the profit under the head of Publications of the Society increased by 511*l.*; also, on the other hand, there was a reduction of 1033*l.* in the expense of publishing the *Journal*. A new edition of 'Hints to Travellers' was published at a cost of 568*l.*; but the charge of publishing 'Supplementary Papers' was reduced by 442*l.*

"The following statement of the net receipts and expenditure of the last five years, exclusive of Balances and Investments, affords proof of the substantial progress and present sound position of the Society's Finances.

	Net Receipts. £	Net Expenditure. £	Difference. £
1890 (year of Mr. Stanley's return)	9532	8219	1313 +
1891	8323	8171	152 +
1892	9300	9012	288 +
1893	11051	11584	533 −
1894	9853	9583*	270 +

"The Investments of the Society have been reduced by a sale of Consols for 1454*l.* 11*s.* 11*d.*, yielding 1500*l.*, and applied to alterations and improvements in the House, and now stand at 20,148*l.* 0*s.* 5*d.*†

"The Arrears of Subscriptions have been reduced from 1521*l.* to 1418*l.*

"The Total Assets of the Society as estimated in 1893 at 47,745*l.* 3*s.* 0½*d.*, may now be estimated at 47,287*l.* 7*s.* 6*d.*

"Rawson W. Rawson,
"Howard Saunders,
"J. D. Thomson,
"E. O. Tudor,
} *Auditors.*

"*April* 25, 1895."

* Special for Alteration, 1478*l.*

† Nominal value; the true value in April being 26,424*l.* 17*s.* 6*d.*

Receipts. **BALANCE SHEET FOR THE YEAR 1894.** *Expenditure.*

1894.	£ s. d.	£ s. d.	1894.	£ s. d.	£ s. d.
Balance in hand Dec. 31, 1893	.. ..	3 18 2½	*House:*—		
Subscriptions:—			Taxes and Insurance ..	110 6 8	
Arrears	442 0 0		Coals, Light and Water	135 10 1	
For the current year ..	4138 0 0		Repairs	94 13 1	
Paid in advance	790 0 0		Miscellaneous..	128 6 1	
		5370 0 0	*Office:*—		468 15 11
Entrance Fees	.. ..	930 0 0	Salaries and Gratuity ..	1038 0 0	
Life Compositions	.. ..	552 10 0	Stationery and Printing	292 17 6	
Parliamentary Grant ..	.. ..	500 0 0	Miscellaneous	151 12 10½	
Royal Premium	.. ..	52 10 0	*Library:*—		1482 10 4½
Rent of Shop	.. ..	107 10 0	Salaries	340 0 0	
Publications:—			Books and Binding ..	124 11 8	
Advertisements in *Journal*	542 15 0		Library Catalogues ..	130 0 0	
Sale of *Journal*	485 6 3		Miscellaneous	152 9 5	
Sale of 'Hints to Travellers'	107 0 0		*Map-room:*—		751 1 1
Sale of Old Series of *Proceedings*	116 18 0		Salaries	548 4 2	
Other Publications ..	46 17 3		Purchase of Maps, etc. .	50 17 6	
		1298 16 6	Repairs to Instruments	6 1 0	
Payments for Scientific Instruction	.. ..	81 5 0	Miscellaneous	111 12 4	
Educational Lectures:—			*Map-Drawing Room:*—		716 15 0
Sale of Tickets	.. ..	37 13 6	Salaries	300 0 0	
Loan of Diagrams and Slides	.. ..	5 15 3	Miscellaneous	3 11 0	
Payments in error	.. ..	54 16 9	*Meetings:*—		303 11 0
Miscellaneous Receipts ..	.. ..	8 11 0	Evening Meetings ..	302 11 6	
Dividends:—			Anniversary Dinner ..	52 15 7	
North-Eastern Railway 4 per Cent. Debenture Stock .. .. 1000*l.*	38 15 10		Miscellaneous	73 18 1	
Great Indian Peninsula Railway 5 per Cent. Stock .. .. 4850*l.*	276 10 3		*Medals and other Awards*	.. ..	429 5 2
Great Western Railway 4½ per Cent. Stock [Davis bequest] 1800*l.*	74 3 9		*Education:*—		228 7 3
London and North-Western Railway 4 per Cent. Stock [Murchison bequest] 1334*l.*	38 16 2		Scientific Instruction ..	167 0 0	
Caledonian Railway 4 per Cent. Preference Stock .. .. 2000*l.*	77 11 2		Oxford and Cambridge Universities	225 0 0	
Norwegian 4 per Cent. Bonds .. .. 1000*l.*	44 15 10		Oxford Studentship ..	50 0 0	
New Zealand 4 per Cent. Stock . 1000*l.*	38 13 4		Owens College	50 0 0	
New South Wales 3½ per Cent. Stock [Gill Memorial] 1028*l.* 5*s.* 6*d.*	34 17 4		Educational Lectures ..	188 7 8	
India Stock .. 1000*l.*	33 18 2		Miscellaneous .. .	22 14 9	
India 3½ per Cent. Debentures . 1000*l.*	31 9 8		*Publications:*—		763 2 5
Consols . 1064*l.* 10*s.* 3*d.*	67 2 10		Printing *Journal*	1070 7 8	
,, [Peek Fund] 1000*l.*	26 12 10		Postage and Addressing	613 17 11	
,, [Back bequest] 561*l.* 0*s.* 8*d.*	14 19 0		Separate copies	51 13 3	
,, [Trevelyan bequest] 510*l.* 4*s.* 0*d.*	13 11 4		Maps	484 18 0	
Metropolitan 3½ Consols 1000*l.* [Derby Legacy]	25 9 0		Illustrations	54 18 3	
Bonus on conversion of Norwegian Bonds and Interest	16 5 0		Payments to Contributors	250 0 0	
		853 11 6	Editor of Publications ..	200 0 0	
Sale of Stock (1454*l.* 11*s.* 11*d.*):—			Miscellaneous	135 15 3	
Alterations to House ..	.. ..	1500 0 0			2841 10 4
	£	11,357 2 8½	'Supplementary Papers'—Printing..	141 18 9	
			Maps	162 9 11	
					304 8 8
			Payment to Mr. Rockhill	.. ..	150 0 0
			Printing Mr. Conway's Map	.. ..	101 18 6
			'Hints to Travellers'—Printing	420 0 0	
			Maps	67 0 0	
			Contributors	81 11 0	
			Expeditions:—		568 11 0
			Grant to Mr. Paton ..	25 0 0	
			Grant to Mr. J. T. Bent	100 0 0	
			Asia Minor Exploration Fund	30 0 0	
			Instruments	349 3 9	
					504 3 9
			Payments in error	.. ..	29 0 0
			Alterations to House ..	.. ..	1478 12 3
			Balance in Bankers' hands, Dec. 31, 1894	275 8 6	
			Do. Accountant's do.	20 1 6	
					295 10 0
				£	11,357 2 8½

E. L. S. COCKS,
Treasurer.

Audited and found correct, April 25, 1895.

RAWSON W. RAWSON,
HOWARD SAUNDERS,
J. D. THOMSON,
E. O. TUDOR,
} *Auditors.*

STATEMENT showing the RECEIPTS and EXPENDITURE of the Society from the Year 1848 to December 31, 1894.

	Year.	Cash Receipts within the Year.	Cash Amounts invested in Funds.	Deducting Amounts invested in Funds; actual Expenditure.
		£ s. d.	£ s. d.	£ s. d.
[1] Includes Treasury Grant of 1000*l.* for the East African Expedition.	1848	696 10 5	.. ..	755 6 1
	1849	778 3 0	.. ..	1098 7 6
[2] Includes Treasury Grant of 2500*l.* for the East African Expedition.	1850	1036 10 5	.. ..	877 2 10
	1851	1056 11 8	.. ..	906 14 7
	1852	1220 3 4	.. ..	995 13 1
[3] Includes Legacy of Mr. Benjamin Oliveira, 1506*l.* 17*s.* 1*d.*	1853	1917 2 6	.. ..	1675 6 0
	1854	2565 7 8	.. ..	2197 19 3
	1855	2584 7 0	.. ..	2636 3 1
[4] Includes Legacy of Mr. Alfred Davis, 1800*l.*	1856	[4] 3372 5 1	533 10 0	2814 8 1
	1857	3142 13 4	378 0 0	3180 19 9
[5] Includes Legacy of Sir Roderick Murchison, 1000*l.*	1858	3089 15 1	.. ..	2944 13 6
	1859	3471 11 8	950 0 0	3423 3 9
[6] Includes Mr. James Young's Grant for Congo Expedition, 2000*l.*	1860	[6] 6449 12 1	466 17 6	5406 3 7
	1861	4792 12 9	1358 2 6	3074 7 4
	1862	4659 7 9	1389 7 6	3095 19 4
[7] Includes 1009*l.* 14*s.* 6*d.*, sale of Exchequer Bills.	1863	5256 9 3	1837 10 0	3655 4 0
	1864	4977 8 6	1796 5 0	3647 7 10
[8] Includes Mr. James Young's Grant for the Congo Expedition, 1041*l.* 14*s.*	1865	4905 8 3	1041 5 0	4307 4 5
	1866	5085 8 3	1028 15 0	4052 15 0
	1867	5462 7 11	1029 0 6	3943 17 4
	1868	5991 4 0	1857 3 9	4156 17 10
[9] Includes Parliamentary Grant of 3000*l.* to Cameron Expedition.	1869	[9] 6859 16 0	2131 5 0	4646 0 8
	1870	[9] 8042 6 1	3802 6 0	3845 10 6
[10] Includes Donation of 500*l.* by Mr. C. J. Lambert.	1871	[10] 6637 3 7	1000 0 0	3726 4 4
	1872	[10] 8119 7 9	1999 4 6	5871 13 2
	1873	[7] 7761 18 10	2015 1 8	6697 12 6
[1] Includes Legacy of Admiral Sir George Back, 540*l.*	1874	[1] 8753 5 10	499 0 0	7876 2 3
	1875	7934 15 10	2002 7 6	5683 4 10
[12] Includes Legacy of Sir W. C. Trevelyan, 500*l.*	1876	[12] 11611 11 8	.. ..	6870 13 1
	1877	[10] 7950 1 11	2538 2 0	8940 17 11*
	1878	[11] 8124 10 0	3000 0 0	6361 9 6
[13] Includes 1005*l.* 8*s.* 2*d.*, sale of Exchequer Bills.	1879	[12] 8979 14 10	1551 10 10	6990 14 2
	1880	8599 18 4	1567 5 1	8454 1 10†
[14] Includes 1000*l.* received from Mr. B. Leigh Smith.	1881	8809 19 5	.. ..	8362 5 6‡
	1882	[13] 8942 15 0	.. ..	8779 10 7
	1883	[14] 9599 9 0	1001 5 0	8624 2 11
[15] Includes 500*l.* on loan from Bankers.	1884	[15] 8964 11 7‡	.. ..	9266 0 5
[16] Includes 998*l.* 0*s.* 10*d.*, sale of India Debentures.	1885	[16] 8738 12 3	.. ..	8555 3 10‡
	1886	[17] 7968 9 0	1000 0 0	7767 18 0‡
	1887	8007 16 3	.. ..	8493 10 3
[17] Includes Donation of 1000*l.* from Miss Gill.	1888	8053 5 0	.. ..	7908 18 6
	1889	8224 7 7	1000 0 0	7025 15 10
[18] Includes Legacy of the Earl of Derby, 1000*l.*			On deposit.	
	1890	9531 16 2	850 0 0	8218 5 10
	1891	8322 16 8	1000 0 0	8171 3 9
	1892	9299 18 7	.. ..	9012 7 5‡
	1893	[18] 11050 2 1	1150 0 6	11584 2 3
	1894	9853 0 0	.. ..	9583 0 0

* This sum includes the Special Parliamentary Grant transferred to the Cameron Expedition Fund in February, 1877.

† This amount includes the payment of two sums of 500*l.* each, contributed to the African Exploration Fund in this and the previous year.

‡ This sum includes the payment of 102*l.* 8*s.* to the African Exploration Fund; also 714*l.* 9*s.* 1*d.*, the final payment for Cameron Expedition Fund.

STATEMENT OF ASSETS.—December 31, 1894.

	£ s. d.
Freehold House, Fittings, and Furniture, estimated (exclusive of Map Collections and Library insured for 10,000*l.*)	.. .. 20,000 0 0
Investments (amount of Stock), as detailed in the above Report of the Auditors, valued April last at	.. .. 26,424 17 6
Arrears due on December 31, 1894, 1418*l.* Estimated at	.. .. 567 0 0
Balance at Bank	£275 8 6
„ in Accountant's hands..	20 1 6
	295 10 0
Total ..	.. £47,287 7 6

ESTIMATE FOR THE YEAR 1895.

RECEIPTS.	£	s.	d.
Subscriptions	5450	0	0
Entrance Fees	900	0	0
Life Compositions	600	0	0
Parliamentary Grant	500	0	0
Royal Premium	52	10	0
Rent of Shop	86	0	0
Publications	1200	0	0
Payments for Scientific Instruction	60	0	0
Payments made in error	50	0	0
Sale of Copper Plates	13	14	10
Loan of Diagrams and Slides	8	0	0
Educational Lectures	20	0	0
Sale of *Proceedings* (Old Series)	50	0	0
Dividends	850	0	0
Total	£9840	4	10

EXPENDITURE.	£	s.	d.
House	470	0	0
Office	1468	0	0
Library	820	0	0
Printing Catalogue	500	0	0
Map Room	686	0	0
Map-Drawing Room	458	0	0
Meetings	654	0	0
Medals and other Awards	170	0	0
Education	753	0	0
Publications:			
Journal	3050	0	0
'Supplementary Papers'	200	0	0
Expeditions	255	0	0
Engraving New Diploma	40	0	0
Messrs. Fox and Bousfield	105	0	0
Alterations to House (Balance)	21	7	9
Payments in error returned	30	0	0
Balance available for contingencies	159	17	1
Total	£9840	4	10

Amount of Guarantee, viz. 600*l.*, to the International Geographical Congress, not included in the estimates of 1895.

Publications.—The monthly *Journal* has been issued with regularity throughout the year; the twelve numbers for 1894 forming two volumes of 1194 pages, illustrated by 35 maps and 62 illustrations. The total cost of the edition of 5500 copies (including 613*l.* 17*s.* 11*d.* for free delivery to Fellows and Institutions) was 2841*l.* 10*s.* 4*d.* From this is to be deducted the amount of 1028*l.* 1*s.* 3*d.* received from sale of copies to the public and from advertisements. The sum of 304*l.* 8*s.* 8*d.* was expended on 'Supplementary Papers.'

Alterations to House.—Since the issue of the last Report considerable alterations and repairs have been carried out for the convenience and comfort of the Fellows. The electric light has been introduced throughout and large additions made to the Library and Map accommodation, and other improvements which it is believed will

add to the efficiency of the Society. The total cost of alterations amounted to 1478*l.* 12*s.* 3*d.*

Library.—During the past year 735 books and pamphlets, in addition to serial publications, have been added to the Library—580 by donation and 155 by purchase; 90 pamphlets have been put in covers by the Society's map-mounter, and 160 volumes have been bound.

The sum of 82*l.* 10*s.* 11*d.* has been spent in books, and 31*l.* 5*s.* for binding.

Library Catalogues.—The Catalogue of the Library arranged alphabetically according to the names of Authors, with supplements (1) detailing the contents of collections of travels, (2) classifying official and anonymous writings, and (3) enumerating transactions and periodicals, is now completed. As soon as the copies are bound they will be issued to Fellows on application.

Work has been continued on the great Subject Catalogue, but this has not been pressed forward in order to allow of the more rapid completion of the Authors' Catalogue.

Presentations to the Library.—The accessions of new books are duly notified in the *Geographical Journal* for each month. The leading English publishers have presented most of the important geographical works published by them during the year; the Secretary of State for India has supplied numerous official publications, and other standard books on India and oriental affairs, while the Agents-General and governments of the colonies have sent their official publications. H.M. Treasury Office has during the year presented two volumes of the *Challenger* report, completing the record of this great national enterprise. The Arch-Duke Ludwig-Salvator of Austria has presented the concluding parts of his princely work on the Lipari Islands. Amongst private benefactors of the Library the name of Dr. R. N. Cust may be mentioned for his gift of twenty volumes on Ethnography.

Instruction.—During the past year 40 intending travellers have received instruction from Mr. Coles, in Practical Astronomy, in the Society's Observatory, and in surveying with the theodolite, prismatic compass, and plane-table, in the country, and 529 hours have been devoted to teaching.

Instruments to the value of 594*l.* 18*s.* have been lent during the past year to the following travellers:—Mr. A. Trevor-Battye (Arctic Regions), 47*l.*; Dr. Donaldson Smith (Somaliland), 103*l.* 5*s.*; Dr. Forsyth Major (Madagascar), 5*l.* 15*s.*; Mr. J. T. Last (Madagascar), 65*l.* 14*s.*; Hon. G. N. Curzon, M.P. (Central Asia), 17*l.* 16*s.*; Mr. S. Vandeleur, Scots Guards (Uganda), 54*l.*; Mr. J. A. R. Munro (Asia Minor), 12*l.* 10*s.*; Mr. C. M. Woodford (Pacific Islands), 29*l.*; Mr. St. G. R. Littledale (Central Asia), 81*l.* 6*s.*; Captain A. St. H. Gibbons (South Central Africa), 71*l.* 7*s.* 6*d.*; Mr. F. C. Selous (South Central Africa), 4*l.* 10*s.*; Sir William Macgregor, K.C.M.G. (British New Guinea), 102*l.* 14*s.* 6*d.*

The instruments lent to the following gentlemen have been returned during the past year, with the exception of those which have been lost:—Major Heath, R.E. (Asia Minor), 1894; Monsieur H. M. P. de la Martinière (Morocco, 1889); Rev. Thomas Wakefield (East Africa), 1883; Mr. D. G. Hogarth (Asia Minor), 1893; Sir William Macgregor (British New Guinea), 1893; Rev. Walter Weston (Japan), 1893; Mr. A. Trevor-Battye (Arctic Regions), 1893–94; Hon. G. N. Curzon, M.P. (Central Asia), 1894; Mr. J. A. R. Munro (Asia Minor), 1894; Mr. G. F. Scott-Elliot (Lake Region, Central Africa), 1893.

The following is a list of travellers who still have instruments lent to them in their possession:—Mr. E. Douglas Archibald (for cloud observations in England), 1885; Mr. T. Bevan (New Guinea), 1887; Mr. H. H. Johnston (Nyasaland, Central Africa), 1889–91 and 94; Rev. A. Hetherwick (South-East Africa), 1891; Dr. D. Kerr Cross (South-East Africa), 1891; Sir C. M. Macdonald (Niger Region),

1891; Mr. C. W. Campbell (Korea), 1893; Lieut. Coningham (Persia), 1893; Mr. J. C. White (Sikkim), 1893; Mr. R. M. W. Swan (South-East Africa), 1893; Captain C. Webster (New Guinea), 1893; Rev. C. H. Robinson (Sahara), 1893; Mrs. Bishop (Korea), 1893; Lieut. F. W. Green, R.A. (Asia Minor), 1894; Mr. R. T. Coryndon (Mashonaland), 1894; Dr. Donaldson Smith (Somaliland), 1894; Dr. Forsyth Major (Madagascar), 1894; Mr. J. T. Last (Madagascar), 1894; Mr. S. Vandeleur, Scots Guards (Uganda), 1894; Mr. C. M. Woodford (Pacific Islands), 1894; Mr. St. G. R. Littledale (Central Asia), 1894; Captain A. St. H. Gibbons (South Central Africa), 1895; Mr. F. C. Selous (South Central Africa), 1895; Sir William Macgregor (British New Guinea), 1895.

Map Room.—The accessions to the Map Room Collection during the past year comprise 785 Maps on 1381 sheets; 29 Atlases (including continuations) containing 510 sheets of Maps, 1722 Photographs, 2 Sketches, and 358 Lantern Slides. Of these, 85 Maps on 488 sheets, 13 Atlases, 130 Photographs, and 358 Lantern Slides have been purchased.

All the more important donations to the Map Room Collection during the past year have been mentioned in the *Geographical Journal*.

The adoption of the Report was moved by Colonel E. S. Gordon, R.A., and seconded by Mr. R. A. Maclean.

PRESENTATION OF THE ROYAL MEDALS AND OTHER AWARDS.

The PRESIDENT: I have now the duty of presenting the Royal Awards to the recipients. Dr. Murray, the Founders' Medal has been adjudicated to you for your great services to physical geography, and especially to oceanography during the last twenty-three years. It is the highest honour that this Society has it in its power to bestow, and it certainly has seldom been more worthily adjudicated than on the present occasion. I well remember in, I think, December, 1872, going down to Sheerness to see all the preparations for scientific work on board the *Challenger*. It is well known how admirably that work was done in subsequent years by the naval officers and scientific staff of that ship. In that work you took your full share. And when afterwards the expedition returned, and on the lamented death of Sir Wyville Thompson, you became the editor of the results of that memorable expedition, a magnificent work, which is now completed in fifty quarto volumes. It was certainly a colossal undertaking. Your country has good reason to be proud of your labours, for they have raised her scientific credit throughout the civilized world, and you have given a stimulus to researches in physical geography which will be enduring. I think it cannot fail to give you additional pleasure, on the completion of your great work, to know that none rejoice more at your success than your old captain, the present Admiral Sir George Nares, and the other survivors amongst your shipmates in the *Challenger* expedition. I now have great pleasure in presenting you with the Founders' Medal.

After presenting the medal to Dr. Murray, the PRESIDENT said: Mr. Curzon, the Patron's Medal of the Society has been awarded to you for your monograph on Persia, containing so much geographical information; for the best existing map of Persia; for your travels in Korea and in French Indo-China; for your exploration of the Pamirs; for your determination of the true course of the Oxus; and for your valuable map of the Pamirs now in progress. I believe that the thoroughness and excellence of your work in connection with these journeys mainly influenced the decision of the Council. This is certainly the aspect of your geographical work which has impressed me most strongly. By diligent and exhaustive research you made yourself intimately acquainted with the history of the geography of those countries which you intended to explore. So far as I can see—and I have studied

your works very carefully—nothing seems to have escaped you. You went forth as a knight fully armed for your work, and that is the way all travellers should go forth. You have thus set an admirable example. Speaking with knowledge, I believe that no traveller from this country, since the days when Sir Henry Rawlinson was young, has approached your excellence in this respect. If, as I anticipate, your exploring career is closed at least for a time, I feel quite sure that you will still wish to continue to be an active and zealous member of this Society, and a warm friend of geographical science. I have great pleasure, Mr. Curzon, in placing in your hands the Patron's Medal.

Dr. MURRAY: Mr. President, ladies and gentlemen, I can assure you that I appreciate very highly the honour that has been conferred upon me; but when I say that, sir, I would like you and the rest of the Fellows of the Society to understand that I appreciate even more the recognition of the *Challenger* expedition itself. Any reputation that I may have acquired in the pursuit of geographical and physical science is, I know too well, founded in the first place upon the work of my colleagues and messmates on board the *Challenger*, and in the second place on the work and labours of a large number of scientific men, both British and foreign, who have been engaged in working up the result of that famous expedition. Perhaps my sole merit is that I commenced with the expedition when it was initiated, and that I have continued to edit the reports of the scientific results that have at last been completed. My life and work have been a sort of thread running through the whole undertaking. I wish it to be distinctly understood, especially when I see some of my old messmates here, and some of the contributors to the report, that all the credit I take to myself is that I have happened to live through to the end, while so many of them have been called to other duties in public service, or have passed away altogether from the scene, and that the honour which has now been conferred upon me might, in other circumstances, also have very justly fallen upon some of them.

The Hon. G. N. CURZON, M.P., in acknowledging the award, said: Mr. President, ladies and gentlemen, You, sir, have told me I ought to follow what would indeed be my own personal inclination, namely, to say a few words to this Society in acknowledgment of the great compliment that they have paid to me. I do indeed feel, sir, almost more than I can describe, the honour that has been bestowed upon me by the gift of this medal, and also by the gracious words with which you have accompanied it. It is true that my travels, such as they have been, have been pursued under serious limitations both of area and of time. They have all been confined, in the first place, to the continent of Asia. I may confess that it was political rather than geographical interest that first took me to that continent, but nevertheless that section of the world's surface, which contains, as Asia does, the greatest mountains, the most imposing glaciers, the most interesting and historic rivers, and almost the widest plains on the surface of the globe, may claim an independent geographical, as well as a political, archæological, and historical interest. The second limitation under which I have suffered has been that of time, and this has been the necessary consequence of what has been absolutely the only exceptional feature of anything I have been able to do in the way of travel or geography—namely, that, owing to the external conditions of my life, I have only been able to take these journeys in the intervals of a parliamentary vacation. I believe I may say with truth, that I am the only member of parliament who has, during the period in which he has sat in the House of Commons, been honoured by the Royal medal of this Society. The whole of my journeys have been accomplished during the period in which I have had a seat at Westminster, and that is another way of saying that I have never had more than a seven months' holiday at a time. This has, I

need hardly say, compelled me to be somewhat rapid in my journeys, and though that may have enabled critics to say that I was a globe-trotter of the Cook's tourist order, at the same time it has not prevented this Society from acknowledging some superior quality in these efforts. Sir, you have been good enough in your remarks to lay stress upon what to me has always been almost the first essential of travel, and that is a long, careful, and studious preparation for the work one is going to undertake. If any traveller in a similar position, or even in a different position to myself, came and said to me, "What would you recommend to any one going to undertake a journey in distant parts?" I would say to him, "In the first place, consult all the highest and most reliable authorities you can find. You will invariably meet with courtesy from them; you will receive from them excellent and invaluable advice. In the second place, read every book, good, bad, or indifferent, that has been written upon the country you propose to visit, so that you may know what to do, and what not to do. In the third place, take no superfluous baggage—it only employs extra time and men; in the fourth place, realize that travel has not only its incidents and adventures, but also its humour; and in the fifth place, never expect any encouragement from the government of your country." You, sir, have been kind enough to say that you hope that, although my travels may be somewhat more restricted in the future, I may still render such service as I am capable of to geographical science. With that wish I most heartily concur. I can only say that during the ten years or more that I have been connected with this Society, it has been a source to me, not merely of inspiration, but of delight. The Royal Geographical Society is an institution from whose officers you meet with every assistance, cordially given, that you can possibly require. There you receive inspiration before you start, and encouragement and reward when you return home. Both as its Councillor and Vice-President, and, at the present moment, as the grateful recipient of your medal, I greatly value my connection with this Society; and even although I may not be able to travel again, I shall never lose my interest in geographical science, and I hope still to be able to render some service to the Society.

The PRESIDENT: Mr. Gude, The Murchison Grant for 1895 has been adjudged to your countryman Mr. Eivind Astrup, for his remarkable journey with Lieutenant Peary across the interior glacier to the northern shores of Greenland; whilst he has also executed some interesting work on his own account along the coast of Melville Bay, and throughout he has shown most remarkable intrepidity and zeal for geographical discovery. The Back Grant has been awarded to another countryman of yours, Captain C. A. Larsen, for the geographical and meteorological observations made by him in 1894, when he penetrated beyond the Antarctic circle as far as the latitude of 68°. He is the first person, I think, who has discovered land—islands—beyond the Antarctic Circle, since the return of Sir James Ross's expedition in 1843, and it is with great pleasure that I place these two grants and the diplomas in your hands as the Secretary to the Legation of Sweden and Norway. I thank you, at the same time, on the part of the Society, for having been so good as to come here to receive them.

Mr. GUDE: Mr. President, I beg to express my thanks, and the best thanks of all my countrymen, for the great honour bestowed upon them, and I will not fail to report it to them.

The PRESIDENT: The Gill Memorial for 1895 has been awarded to Captain J. Pringle, R.E., for having sent us a very valuable account of the geographical work he has done under the orders of Major Macdonald, whilst engaged on the railway survey between Mombassa and Lake Victoria. Major Darwin has kindly undertaken to receive the diploma for him.

Major DARWIN, M.P.: I am glad to receive this diploma for a brother officer of my own.

The PRESIDENT: Mr. Scott-Elliot, The Cuthbert Peek Grant has been awarded to you for your exploration of Mount Ruwenzori, and of the country west of Victoria Nyanza, and for the additions made to our knowledge of the botanical geography of the African highlands. I have great pleasure in placing the grant in your hands.*

THE BALLOT FOR THE NEW COUNCIL.

The PRESIDENT then announced that, according to the report of the scrutineers, the list as prepared by the Council had been duly elected.

The list is as follows, the names of new members, or those who change office, being printed in *italics*:—

President:—Clements R. Markham, C.B., F.R.S., F.S.A. *Vice-Presidents*: W. T. Blanford, Esq., LL.D., F.R.S., F.G.S.; Hon. G. C. Brodrick; Hon. George N. Curzon, M.P.; *Sir George D. Taubman Goldie*, K.C.M.G.; General R. Strachey, R.E., C.S.I., F.R.S.; Rear-Admiral W. J. L. Wharton, F.R.S. *Treasurer*: Edward L. Somers Cocks. *Trustees*: Right Hon. Sir John Lubbock, Bart., F.R.S., M.P.; *Cuthbert E. Peek*, F.A.S. *Secretaries*: H. Seebohm, F.L.S.; Major Leonard Darwin, R.E., M.P. *Foreign Secretary*: Sir John Kirk, K.C.B., G.C.M.G., F.R.S. *Councillors*: *W. M. Beaufort*; Robert Brown, M.A., PH.D., F.L.S.; *George Cawston*; Right Hon. Hugh C. E. Childers, F.R.S.; General Sir T. E. Gordon, C.B., K.C.S.I.; Wilfred Hudleston, F.R.S., F.G.S.; Lord Lamington; J. K. Laughton; George Sutherland Mackenzie; Rear-Admiral Albert Hastings Markham; *A. P. Maudslay*; John Murray; Ernest G. Ravenstein; Howard Saunders, F.L.S., F.Z.S.; *Right Hon. the Earl of Scarbrough*; Rear-Admiral E. Hobart Seymour, C.B.; *Major the Hon. M. G. Talbot*, R.E.; Lieut-Colonel J. K. Trotter, R.A.; *General J. T. Walker*, R.E., C.B.; *Admiral Hon. W. J. Ward*; Lieut.-Colonel C. M. Watson, R.E., C.M.G.

The President then delivered his annual address (see p. 1), after which the Hon. G. C. BRODRICK spoke as follows: Ladies and gentlemen, I have been asked to say a few words, and they will be very few, in proposing what you will all anticipate—a vote of thanks to our President for his admirable address. We all remember that when our late President retired, the choice of his successor was a subject of some anxiety. I think we all feel that there are two great qualifications not very often combined in the same individual: a thorough knowledge and sympathy with geography, and, on the other hand, a thorough knowledge of the business of

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* The Medals for the promotion of geographical education, placed by the Society at the disposal of the Syndicates respectively of the Oxford and Cambridge Local Examinations, were awarded as follows:—

1894. Oxford (June).—*Silver Medal*—W. G. Bower. *Silver Medal*—E. W. Wallis. *Silver Medal*—P. Jarrett.

For the bronze medal no candidate of sufficient merit appeared.

Cambridge (December).—*Silver Medal* (Physical Geography)—Samuel Henry Clifford Briggs. *Silver Medal* (Physical Geography)—John Arnold Cherry. *Silver Medal* (Political Geography)—William Gregory Rivers. *Silver Medal* (Political Geography)—John Frame.

The prizes offered by the Society for geographical proficiency to the cadets of the Nautical Training Colleges, on board H.M.S. *Worcester* and *Conway*, were awarded at the examination held in July, 1894, to the following:—*Worcester* training-ship—First prize, to Algernon Percy Le Clerc Faught. Second prize, to Joseph Leonard Hall. *Conway* training-ship—First prize, to Herbert Raymond Bateman. Second prize, to Thomas Samuel Beauchamp Williams.

this Society—a knowledge which can only be obtained by long experience. Well, I am sure I speak the feelings of all present when I say that we find that combination in Mr. Markham to a degree which could not have been equalled by any other man. Some of us can remember Sir Roderick Murchison, and I do not suppose any of us who knew him expected that we should ever find a second Sir Roderick Murchison to preside over us in the Chair. We have had many eminent Presidents since that day, but I have no hesitation in saying that no one of them has come so near possessing the qualifications of Sir Roderick Murchison as our President of to-day. We have heard something of exceptional activity during the past year in the field of geographical exploration, but I am sure that there has been equally exceptional activity in the office of this Society, and the motive power of that activity has been our President. He has thrown life and spirit into the whole work of this Society, and I regard the excellent address we have just heard from him—summarizing so well the geographical work of the past year, and reminding us of the improvements that have been made in the buildings of the Society, and in so many other ways—I regard that address as only another proof of the wonderful and most successful energy which he has brought to bear upon every department of the work of this Society; and therefore I have the greatest pleasure in proposing a vote of thanks to him on this occasion.

Vice-Admiral Sir GEORGE NARES, K.C.B.: I have much pleasure in seconding that resolution.

The PRESIDENT: I have been very much touched by Mr. Brodrick's kindness, and by the way in which he has alluded to my services. I am happy to think, at all events, that you understand that I have worked hard and done my best for the Society. Of course, no one knows better than I do my disqualifications for this post, and I can only feel thankful that you have not yet found them out. I hope that the day when you will do so is far distant. The meeting is now adjourned, and I trust that we shall all meet again at the reception this evening.

Special Meeting, June 6, 1895.—Admiral W. J. L. WHARTON, C.B., F.R.S., Vice-President, in the Chair.

The Paper read was:—

"An Expedition to the Frankincense Country, Southern Arabia." By J. Theodore Bent.

Thirteenth Ordinary Meeting, June 17, 1895.—The Hon. G. N. CURZON, M.P., Vice-President, in the Chair.

ELECTIONS.—*Rev. Edwin J. Frayling; Captain J. James; Captain C. E. Salvesen, R.E.; Cecil Harcourt Smith; Colonel Swinton, R.A.*

The Paper read was:—

"Armenia." By H. F. B. Lynch.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By HUGH ROBERT MILL, D.Sc., *Librarian*, R.G.S.

THE following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Com. = Commerce, Commercial.
C. R. = Comptes Rendus.
Erdk. = Erdkunde.
G. = Geography, Geographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
J. = Journal.
M. = Mitteilungen.
Mag. = Magazine.
P. = Proceedings.
R. = Royal.
Rev. = Review, Revue, Revista.
S. = Society, Société, Selskab.
Sitzb. = Sitzungsbericht.
T. = Transactions.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

EUROPE.

Alps—Transverse Valleys. *Z. Ges. Erdk. Berlin* **30** (1895): 1-94. **Futterer.**
Durchbruchsthäler in den Süd-Alpen. Von Dr. Karl Futterer. *With Maps and Profiles.*

France—Beaujolais and Lyonnais. *Ann. G.* **4** (1895): 287-309. **Gallois.**
Mâconnais, Charolais, Beaujolais, Lyonnais; III., le Beaujolais et le Lyonnais. Par M. L. Gallois.
Continuation of a series of papers on regional geography.

France—Languedoc. *B.S. Languedoc. G.* **17** (1894): 187-254. **Malavialle.**
Le littoral du Bas-Languedoc. Par M. L. Malavialle.

France—The Morvan. **Hovelacque and Hervé.**
Mem. S. d'Anthropologie Paris **1** (3 S.) (1894): 1-256.
Recherches éthnologiques sur le Morvan. Par Ab. Hovelacque et G. Hervé. *With Plate.*
This forms an "annexe" to the *Bulletin* of the Paris Anthropological Society.

France—Rhone Delta. *B.S. Languedoc. G.* **17** (1894): 5-23. **Flahault and Combres.**
Observations sur la part qui revient au cordon littoral dans l'exhaussement actuel du Delta du Rhone. Par MM. Flahault et Combres.

Germany—Lorraine. *Deutsche G. Blätter* **18** (1895): 19-35. **Gerdolle.**
Die Wälder Deutsch-Lothringens. Von H. Gerdolle. *With Map.*

Luxemburg. *B. Union G. Nord de la France* **15** (1894): 97-116. **Paillot.**
Le Grande-Duché de Luxembourg et Trèves, conférence faite par M. René Paillot.

Spain. **Luffmann.**
A Vagabond in Spain. By C. Bogue Luffmann. London: John Murray, 1895. Size 8 × 5¼, pp. xvi. and 346. *Frontispiece. Price* 6*s. Presented by the Publisher.*
An entertaining account of a walk of 1500 miles through Spain from Biarritz to Malaga.

Sweden—Norrland. *Globus* **67** (1895): 245-248. **Deecke.**
Skizzen aus Norrland (Nordschweden). Von W. Deecke. Greifswald. *With Illustrations.*

ASIA.

Asia Minor—Railways. *Deutsche Rundschau G.* **17** (1895): 322-323. ——
Die Eisenbahnen Kleinasiens. *With Map.*
The map is on the scale of 1 : 5,800,000.

Barren Island. **Mallet.**
Records Geolog. Surv. India **28** (1895): 22-38.
Some early allusions to Barren Island; with a few remarks thereon by F. R. Mallett.
Bibliography of Barren Island and Narcondam, from 1884 to 1894; with some remarks by F. R. Mallet. *With Illustration.*

Central Asia—Mustagh-ata. *Z. Ges. Erdk. Berlin* **30** (1895): 94–134. **Hedin.**
Die Gletscher des Mus-tag-ata. Von Dr. Sven Hedin. *With Plates.*

Ceylon and India. **Klein.**
Among the Gods, Scenes of India; with Legends by the way. By Augusta Klein. Edinburgh and London: W. Blackwood & Sons, 1895. Size 9 × 6, pp. x. and 356. *Illustrations. Price* 15*s. Presented by the Publishers.*

A typical volume of "light travel," conveying a good deal of information as to the more frequently visited towns and temples of Ceylon and India, and illustrated by excellent photographs.

Russia—Aralo-Caspian Region. **Sjögren.**
Ueber das Diluviale, aralokaspische Meer und die nordeuropäische Vereisung. Von Hj. Sjögren in Baku. [From Jahrbuch der k. k. geol. Reichsanstalt, 1890, 40 Band. 1 Heft.] Size 10½ × 7½, pp. [26]. *Presented by the Royal University of Upsala.*

Russia—Transcaspian Railway. *Ann. G.* **4** (1895): 325–345. **Blanc.**
Le chemin de fer Transcaspien. Par M. Éd. Blanc. *With Sketches.*

CENTRAL AND SOUTH AMERICA.

Brazil—Amazonas. **Leal.**
Viagem a um paiz de selvagens. Por Oscar Leal. Lisbon: Antonio Maria Pereira, 1895. Size 7½ × 5½, pp. 232. *Illustrations. Presented by the Author.*

Ecuador—Galapagos. **White.**
A needed foothold in the Pacific. By Arthur Silva White. From the *United Service Magazine*, September, 1894. Size 9½ × 6, pp. [6].

Mr. Silva White points out the importance of the Galapagos Islands as a point on the new routes across the Pacific.

Paraguay. *J.S. Arts* 43 (1895): 353–364. **Baillie.**
The Republic of Paraguay. By Alexander F. Baillie.

Jamaica. **Musson and Roxburgh.**
The Handbook of Jamaica for 1895. Published by Authority, comprising Historical, Statistical, and General Information concerning the Island. Compiled . . . by S. P. Musson and T. Laurence Roxburgh. London: E. Stanford, 1895. Size 8½ × 6, pp. viii. and 590. *Map. Price* 8*s. Presented by the Publisher.*

This well-known handbook is indispensable as an official record of the geography and statistics of Jamaica.

Spanish West Indies—Porto Rico. **Sievers.**
M.G. Ges. Hamburg, 1891–92 (1895): 217–236.
Zur Kenntniss Puerto Rico's. Von Prof. Dr. Wilhelm Sievers. *With Map.*

Argentine Republic. *B.A. Nac. Córdoba* **14** (1894): 21–54. **Bodenbender.**
La llanura al Este de la sierra de Córdoba. Contribución á la historia del desarrollo de la llanura pampeana. Por Guillermo Bodenbender.

Argentine Republic. *Rev. Museo La Plata* **6** (1894): 1–24. **Valentin.**
Rapido estudio sobre las Sierras de los Partidos de Olavarria y del Azul (Provincia de Buenos Aires). Por el Dr. Juan Valentin. *With Plates.*

Argentine Republic—Cordoba. *B.A. Nac. Córdoba* **14** (1894): 55–92. **Doering.**
La insolacion en Córdoba. Resultados correspondientes al quinquenio 1889–1893. Por Oscar Doering.
Sunshine records at Cordoba.

Bolivia. *Rev. Museo La Plata* **6** (1894): 141–219. **Pando.**
Viaje á la Región de la Goma Elastica (N. O. de Bolivia). Por José Manuel Pando. *With Map.*

Bolivia—Titicaca. *Deutsche G. Blätter* **18** (1895): 100–109. **Copeland.**
Ein Besuch auf der Insel Titicaca. Von Dr. R. Copeland.

STATEMENT showing the RECEIPTS and EXPENDITURE of the Society from the Year 1848 to December 31, 1894.

	Year.	Cash Receipts within the Year.	Cash Amounts invested in Funds.	Deducting Amounts invested in Funds; actual Expenditure.
		£ s. d.	£ s. d.	£ s. d.
[1] Includes Treasury Grant of 1000*l.* for the East African Expedition.	1848	696 10 5	.. ..	755 6 1
	1849	778 3 0	.. ..	1098 7 6
[2] Includes Treasury Grant of 2500*l.* for the East African Expedition.	1850	1036 10 5	.. ..	877 2 10
	1851	1058 11 8	.. ..	906 14 7
	1852	1220 3 4	.. ..	995 13 1
[3] Includes Legacy of Mr. Benjamin Oliveira, 1506*l.* 17*s.* 1*d.*	1853	1917 2 6	.. ..	1675 6 0
	1854	2565 7 8	.. ..	2197 19 3
[4] Includes Legacy of Mr. Alfred Davis, 1800*l.*	1855	2584 7 0	.. ..	2636 3 1
	1856	[4] 3372 5 1	533 10 0	2814 8 1
	1857	3142 13 4	378 0 0	3480 19 9
[5] Includes Legacy of Sir Roderick Murchison, 1000*l.*	1858	3089 15 1	.. ..	2944 13 6
	1859	3471 11 8	950 0 0	3423 3 9
[6] Includes Mr. James Young's Grant for Congo Expedition, 2000*l.*	1860	[6] 6449 12 1	466 17 6	5406 3 7
	1861	4792 12 9	1358 2 6	3074 7 4
	1862	4659 7 9	1389 7 6	3095 19 4
[7] Includes 1009*l.* 14*s.* 6*d.*, sale of Exchequer Bills.	1863	5256 9 3	1837 10 0	3655 4 0
	1864	4977 8 6	1796 5 0	3647 7 10
[8] Includes Mr. James Young's Grant for the Congo Expedition, 1041*l.* 14*s.*	1865	4905 8 3	1041 5 0	4307 4 5
	1866	5085 8 3	1028 15 0	4052 15 0
	1867	5462 7 11	1029 0 6	3943 17 4
	1868	5991 4 0	1857 3 9	4156 17 10
[9] Includes Parliamentary Grant of 3000*l.* to Cameron Expedition.	1869	[7] 6859 16 0	2131 5 0	4646 0 8
	1870	[8] 8042 6 1	3802 6 0	3845 10 6
[10] Includes Donation of 800*l.* by Mr. C. J. Lambert.	1871	[9] 6637 3 7	1000 0 0	3726 4 4
	1872	[10] 8119 7 9	1999 4 6	5871 13 2
[11] Includes Legacy of Admiral Sir George Back, 540*l.*	1873	[11] 7761 18 10	2015 1 8	6697 12 6
	1874	[12] 8753 5 10	499 0 0	7876 2 3
	1875	7934 15 10	2002 7 6	5683 4 10
[12] Includes Legacy of Sir W. C. Trevelyan, 500*l.*	1876	[13] 11611 11 8	.. ..	6870 13 1
	1877	[14] 7950 1 11	2538 2 0	8940 17 11*
	1878	[15] 8124 10 0	3000 0 0	6361 9 6
[13] Includes 1005*l.* 8*s.* 2*d.*, sale of Exchequer Bills.	1879	[16] 8979 14 10	1551 10 10	6990 14 2
	1880	8599 18 4	1567 5 1	8454 1 10†
[14] Includes 1000*l.* received from Mr. B. Leigh Smith.	1881	8809 19 5	.. ..	8362 5 6‡
	1882	[17] 8942 15 0	.. ..	8779 10 7
	1883	[18] 9599 9 0	1001 5 0	8624 2 11
[15] Includes 500*l.* on loan from Bankers.	1884	[19] 8964 11 7‡	.. ..	9266 0 5
[16] Includes 998*l.* 0*s.* 10*d.*, sale of India Debentures.	1885	[20] 8738 12 3	.. ..	8555 3 10‡
	1886	[21] 7968 9 0	1000 0 0	7767 18 0‡
[17] Includes Donation of 1000*l.* from Miss Gill.	1887	8007 16 3	.. ..	8493 10 3
	1888	8053 5 0	.. ..	7908 18 6
[18] Includes Legacy of the Earl of Derby, 1000*l.*	1889	8224 7 7	1000 0 0	7025 15 10
			On deposit.	
	1890	9531 16 2	850 0 0	8218 5 10
	1891	8322 16 8	1000 0 0	8171 3 9
	1892	9299 18 7	.. ..	9012 7 5‡
	1893	[22] 11050 2 1	1150 0 6	11584 2 3
	1894	9853 0 0	.. ..	9583 0 0

* This sum includes the Special Parliamentary Grant transferred to the Cameron Expedition Fund in February, 1877.

† This amount includes the payment of two sums of 500*l.* each, contributed to the African Exploration Fund in this and the previous year.

‡ This sum includes the payment of 102*l.* 8*s.* to the African Exploration Fund; also 714*l.* 9*s.* 1*d.*, the final payment for Cameron Expedition Fund.

STATEMENT OF ASSETS.—December 31, 1894.

	£ s. d.
Freehold House, Fittings, and Furniture, estimated (exclusive of Map Collections and Library insured for 10,000*l.*)	20,000 0 0
Investments (amount of Stock), as detailed in the above Report of the Auditors, valued April last at	26,424 17 6
Arrears due on December 31, 1894, 1418*l.* Estimated at	567 0 0
Balance at Bank £275 8 6	
„ in Accountant's hands.. .. .. 20 1 6	
	295 10 0
Total	£47,287 7 6

ESTIMATE FOR THE YEAR 1895.

Receipts.

	£	s.	d.
Subscriptions	5450	0	0
Entrance Fees	900	0	0
Life Compositions	600	0	0
Parliamentary Grant	500	0	0
Royal Premium	52	10	0
Rent of Shop	86	0	0
Publications	1200	0	0
Payments for Scientific Instruction	60	0	0
Payments made in error	50	0	0
Sale of Copper Plates	13	14	10
Loan of Diagrams and Slides	8	0	0
Educational Lectures	20	0	0
Sale of *Proceedings* (Old Series)	50	0	0
Dividends	850	0	0
Total	£9840	4	10

Expenditure.

	£	s.	d.
House	470	0	0
Office	1468	0	0
Library	820	0	0
Printing Catalogue	500	0	0
Map Room	686	0	0
Map-Drawing Room	458	0	0
Meetings	654	0	0
Medals and other Awards	170	0	0
Education	753	0	0
Publications:			
Journal	3050	0	0
'Supplementary Papers'	200	0	0
Expeditions	255	0	0
Engraving New Diploma	40	0	0
Messrs. Fox and Bousfield	105	0	0
Alterations to House (Balance)	21	7	9
Payments in error returned	30	0	0
Balance available for contingencies	159	17	1
Total	£9840	4	10

Amount of Guarantee, viz. 600*l.*, to the International Geographical Congress, not included in the estimates of 1895.

Publications.—The monthly *Journal* has been issued with regularity throughout the year; the twelve numbers for 1894 forming two volumes of 1194 pages, illustrated by 35 maps and 62 illustrations. The total cost of the edition of 5500 copies (including 613*l.* 17*s.* 11*d.* for free delivery to Fellows and Institutions) was 2841*l.* 10*s.* 4*d.* From this is to be deducted the amount of 1028*l.* 1*s.* 3*d.* received from sale of copies to the public and from advertisements. The sum of 304*l.* 8*s.* 8*d.* was expended on 'Supplementary Papers.'

Alterations to House.—Since the issue of the last Report considerable alterations and repairs have been carried out for the convenience and comfort of the Fellows. The electric light has been introduced throughout and large additions made to the Library and Map accommodation, and other improvements which it is believed will

add to the efficiency of the Society. The total cost of alterations amounted to 1478*l.* 12*s.* 3*d.*

Library.—During the past year 735 books and pamphlets, in addition to serial publications, have been added to the Library—580 by donation and 155 by purchase; 90 pamphlets have been put in covers by the Society's map-mounter, and 160 volumes have been bound.

The sum of 82*l.* 10*s.* 11*d.* has been spent in books, and 31*l.* 5*s.* for binding.

Library Catalogues.—The Catalogue of the Library arranged alphabetically according to the names of Authors, with supplements (1) detailing the contents of collections of travels, (2) classifying official and anonymous writings, and (3) enumerating transactions and periodicals, is now completed. As soon as the copies are bound they will be issued to Fellows on application.

Work has been continued on the great Subject Catalogue, but this has not been pressed forward in order to allow of the more rapid completion of the Authors' Catalogue.

Presentations to the Library.—The accessions of new books are duly notified in the *Geographical Journal* for each month. The leading English publishers have presented most of the important geographical works published by them during the year; the Secretary of State for India has supplied numerous official publications, and other standard books on India and oriental affairs, while the Agents-General and governments of the colonies have sent their official publications. H.M. Treasury Office has during the year presented two volumes of the *Challenger* report, completing the record of this great national enterprise. The Arch-Duke Ludwig-Salvator of Austria has presented the concluding parts of his princely work on the Lipari Islands. Amongst private benefactors of the Library the name of Dr. R. N. Cust may be mentioned for his gift of twenty volumes on Ethnography.

Instruction.—During the past year 40 intending travellers have received instruction from Mr. Coles, in Practical Astronomy, in the Society's Observatory, and in surveying with the theodolite, prismatic compass, and plane-table, in the country, and 529 hours have been devoted to teaching.

Instruments to the value of 594*l.* 18*s.* have been lent during the past year to the following travellers:—Mr. A. Trevor-Battye (Arctic Regions), 47*l.*; Dr. Donaldson Smith (Somaliland), 103*l.* 5*s.*; Dr. Forsyth Major (Madagascar), 5*l.* 15*s.*; Mr. J. T. Last (Madagascar), 65*l.* 14*s.*; Hon. G. N. Curzon, M.P. (Central Asia), 17*l.* 16*s.*; Mr. S. Vandeleur, Scots Guards (Uganda), 54*l.*; Mr. J. A. R. Munro (Asia Minor), 12*l.* 10*s.*; Mr. C. M. Woodford (Pacific Islands), 29*l.*; Mr. St. G. R. Littledale (Central Asia), 81*l.* 6*s.*; Captain A. St. H. Gibbons (South Central Africa), 71*l.* 7*s.* 6*d.*; Mr. F. C. Selous (South Central Africa), 4*l.* 10*s.*; Sir William Macgregor, K.C.M.G. (British New Guinea), 102*l.* 14*s.* 6*d.*

The instruments lent to the following gentlemen have been returned during the past year, with the exception of those which have been lost:—Major Heath, R.E. (Asia Minor), 1894; Monsieur H. M. P. de la Martinière (Morocco, 1889); Rev. Thomas Wakefield (East Africa), 1883; Mr. D. G. Hogarth (Asia Minor), 1893; Sir William Macgregor (British New Guinea), 1893; Rev. Walter Weston (Japan), 1893; Mr. A. Trevor-Battye (Arctic Regions), 1893–94; Hon. G. N. Curzon, M.P. (Central Asia), 1894; Mr. J. A. R. Munro (Asia Minor), 1894; Mr. G. F. Scott-Elliot (Lake Region, Central Africa), 1893.

The following is a list of travellers who still have instruments lent to them in their possession:—Mr. E. Douglas Archibald (for cloud observations in England), 1885; Mr. T. Bevan (New Guinea), 1887; Mr. H. H. Johnston (Nyasaland, Central Africa), 1889–91 and 94; Rev. A. Hetherwick (South-East Africa), 1891; Dr. D. Kerr Cross (South-East Africa), 1891; Sir C. M. Macdonald (Niger Region),

1891; Mr. C. W. Campbell (Korea), 1893; Lieut. Coningham (Persia), 1893; Mr. J. C. White (Sikkim), 1893; Mr. R. M. W. Swan (South-East Africa), 1893; Captain C. Webster (New Guinea), 1893; Rev. C. H. Robinson (Sahara), 1893; Mrs. Bishop (Korea), 1893; Lieut. F. W. Green, R.A. (Asia Minor), 1894; Mr. R. T. Coryndon (Mashonaland), 1894; Dr. Donaldson Smith (Somaliland), 1894; Dr. Forsyth Major (Madagascar), 1894; Mr. J. T. Last (Madagascar), 1894; Mr. S. Vandeleur, Scots Guards (Uganda), 1894; Mr. C. M. Woodford (Pacific Islands), 1894; Mr. St. G. R. Littledale (Central Asia), 1894; Captain A. St. H. Gibbons (South Central Africa), 1895; Mr. F. C. Selous (South Central Africa), 1895; Sir William Macgregor (British New Guinea), 1895.

Map Room.—The accessions to the Map Room Collection during the past year comprise 785 Maps on 1381 sheets; 29 Atlases (including continuations) containing 510 sheets of Maps, 1722 Photographs, 2 Sketches, and 358 Lantern Slides. Of these, 85 Maps on 488 sheets, 13 Atlases, 130 Photographs, and 358 Lantern Slides have been purchased.

All the more important donations to the Map Room Collection during the past year have been mentioned in the *Geographical Journal*.

The adoption of the Report was moved by Colonel E. S. Gordon, R.A., and seconded by Mr. R. A. Maclean.

PRESENTATION OF THE ROYAL MEDALS AND OTHER AWARDS.

The PRESIDENT: I have now the duty of presenting the Royal Awards to the recipients. Dr. Murray, the Founders' Medal has been adjudicated to you for your great services to physical geography, and especially to oceanography during the last twenty-three years. It is the highest honour that this Society has it in its power to bestow, and it certainly has seldom been more worthily adjudicated than on the present occasion. I well remember in, I think, December, 1872, going down to Sheerness to see all the preparations for scientific work on board the *Challenger*. It is well known how admirably that work was done in subsequent years by the naval officers and scientific staff of that ship. In that work you took your full share. And when afterwards the expedition returned, and on the lamented death of Sir Wyville Thompson, you became the editor of the results of that memorable expedition, a magnificent work, which is now completed in fifty quarto volumes. It was certainly a colossal undertaking. Your country has good reason to be proud of your labours, for they have raised her scientific credit throughout the civilized world, and you have given a stimulus to researches in physical geography which will be enduring. I think it cannot fail to give you additional pleasure, on the completion of your great work, to know that none rejoice more at your success than your old captain, the present Admiral Sir George Nares, and the other survivors amongst your shipmates in the *Challenger* expedition. I now have great pleasure in presenting you with the Founders' Medal.

After presenting the medal to Dr. Murray, the PRESIDENT said: Mr. Curzon, the Patron's Medal of the Society has been awarded to you for your monograph on Persia, containing so much geographical information; for the best existing map of Persia; for your travels in Korea and in French Indo-China; for your exploration of the Pamirs; for your determination of the true course of the Oxus; and for your valuable map of the Pamirs now in progress. I believe that the thoroughness and excellence of your work in connection with these journeys mainly influenced the decision of the Council. This is certainly the aspect of your geographical work which has impressed me most strongly. By diligent and exhaustive research you made yourself intimately acquainted with the history of the geography of those countries which you intended to explore. So far as I can see—and I have studied

your works very carefully—nothing seems to have escaped you. You went forth as a knight fully armed for your work, and that is the way all travellers should go forth. You have thus set an admirable example. Speaking with knowledge, I believe that no traveller from this country, since the days when Sir Henry Rawlinson was young, has approached your excellence in this respect. If, as I anticipate, your exploring career is closed at least for a time, I feel quite sure that you will still wish to continue to be an active and zealous member of this Society, and a warm friend of geographical science. I have great pleasure, Mr. Curzon, in placing in your hands the Patron's Medal.

Dr. MURRAY: Mr. President, ladies and gentlemen, I can assure you that I appreciate very highly the honour that has been conferred upon me; but when I say that, sir, I would like you and the rest of the Fellows of the Society to understand that I appreciate even more the recognition of the *Challenger* expedition itself. Any reputation that I may have acquired in the pursuit of geographical and physical science is, I know too well, founded in the first place upon the work of my colleagues and messmates on board the *Challenger*, and in the second place on the work and labours of a large number of scientific men, both British and foreign, who have been engaged in working up the result of that famous expedition. Perhaps my sole merit is that I commenced with the expedition when it was initiated, and that I have continued to edit the reports of the scientific results that have at last been completed. My life and work have been a sort of thread running through the whole undertaking. I wish it to be distinctly understood, especially when I see some of my old messmates here, and some of the contributors to the report, that all the credit I take to myself is that I have happened to live through to the end, while so many of them have been called to other duties in public service, or have passed away altogether from the scene, and that the honour which has now been conferred upon me might, in other circumstances, also have very justly fallen upon some of them.

The Hon. G. N. CURZON, M.P., in acknowledging the award, said: Mr. President, ladies and gentlemen, You, sir, have told me I ought to follow what would indeed be my own personal inclination, namely, to say a few words to this Society in acknowledgment of the great compliment that they have paid to me. I do indeed feel, sir, almost more than I can describe, the honour that has been bestowed upon me by the gift of this medal, and also by the gracious words with which you have accompanied it. It is true that my travels, such as they have been, have been pursued under serious limitations both of area and of time. They have all been confined, in the first place, to the continent of Asia. I may confess that it was political rather than geographical interest that first took me to that continent, but nevertheless that section of the world's surface, which contains, as Asia does, the greatest mountains, the most imposing glaciers, the most interesting and historic rivers, and almost the widest plains on the surface of the globe, may claim an independent geographical, as well as a political, archæological, and historical interest. The second limitation under which I have suffered has been that of time, and this has been the necessary consequence of what has been absolutely the only exceptional feature of anything I have been able to do in the way of travel or geography—namely, that, owing to the external conditions of my life, I have only been able to take these journeys in the intervals of a parliamentary vacation. I believe I may say with truth, that I am the only member of parliament who has, during the period in which he has sat in the House of Commons, been honoured by the Royal medal of this Society. The whole of my journeys have been accomplished during the period in which I have had a seat at Westminster, and that is another way of saying that I have never had more than a seven months' holiday at a time. This has, I

need hardly say, compelled me to be somewhat rapid in my journeys, and though that may have enabled critics to say that I was a globe-trotter of the Cook's tourist order, at the same time it has not prevented this Society from acknowledging some superior quality in these efforts. Sir, you have been good enough in your remarks to lay stress upon what to me has always been almost the first essential of travel, and that is a long, careful, and studious preparation for the work one is going to undertake. If any traveller in a similar position, or even in a different position to myself, came and said to me, "What would you recommend to any one going to undertake a journey in distant parts?" I would say to him, "In the first place, consult all the highest and most reliable authorities you can find. You will invariably meet with courtesy from them; you will receive from them excellent and invaluable advice. In the second place, read every book, good, bad, or indifferent, that has been written upon the country you propose to visit, so that you may know what to do, and what not to do. In the third place, take no superfluous baggage—it only employs extra time and men; in the fourth place, realize that travel has not only its incidents and adventures, but also its humour; and in the fifth place, never expect any encouragement from the government of your country." You, sir, have been kind enough to say that you hope that, although my travels may be somewhat more restricted in the future, I may still render such service as I am capable of to geographical science. With that wish I most heartily concur. I can only say that during the ten years or more that I have been connected with this Society, it has been a source to me, not merely of inspiration, but of delight. The Royal Geographical Society is an institution from whose officers you meet with every assistance, cordially given, that you can possibly require. There you receive inspiration before you start, and encouragement and reward when you return home. Both as its Councillor and Vice-President, and, at the present moment, as the grateful recipient of your medal, I greatly value my connection with this Society; and even although I may not be able to travel again, I shall never lose my interest in geographical science, and I hope still to be able to render some service to the Society.

The PRESIDENT: Mr. Gude, The Murchison Grant for 1895 has been adjudged to your countryman Mr. Eivind Astrup, for his remarkable journey with Lieutenant Peary across the interior glacier to the northern shores of Greenland; whilst he has also executed some interesting work on his own account along the coast of Melville Bay, and throughout he has shown most remarkable intrepidity and zeal for geographical discovery. The Back Grant has been awarded to another countryman of yours, Captain C. A. Larsen, for the geographical and meteorological observations made by him in 1894, when he penetrated beyond the Antarctic circle as far as the latitude of 68°. He is the first person, I think, who has discovered land—islands—beyond the Antarctic Circle, since the return of Sir James Ross's expedition in 1843, and it is with great pleasure that I place these two grants and the diplomas in your hands as the Secretary to the Legation of Sweden and Norway. I thank you, at the same time, on the part of the Society, for having been so good as to come here to receive them.

Mr. GUDE: Mr. President, I beg to express my thanks, and the best thanks of all my countrymen, for the great honour bestowed upon them, and I will not fail to report it to them.

The PRESIDENT: The Gill Memorial for 1895 has been awarded to Captain J. Pringle, R.E., for having sent us a very valuable account of the geographical work he has done under the orders of Major Macdonald, whilst engaged on the railway survey between Mombassa and Lake Victoria. Major Darwin has kindly undertaken to receive the diploma for him.

Major DARWIN, M.P.: I am glad to receive this diploma for a brother officer of my own.

The PRESIDENT: Mr. Scott-Elliot, The Cuthbert Peek Grant has been awarded to you for your exploration of Mount Ruwenzori, and of the country west of Victoria Nyanza, and for the additions made to our knowledge of the botanical geography of the African highlands. I have great pleasure in placing the grant in your hands.*

THE BALLOT FOR THE NEW COUNCIL.

The PRESIDENT then announced that, according to the report of the scrutineers, the list as prepared by the Council had been duly elected.

The list is as follows, the names of new members, or those who change office, being printed in *italics*:—

President:—Clements R. Markham, C.B., F.R.S., F.S.A. *Vice-Presidents*: W. T. Blanford, Esq., LL.D., F.R.S., F.G.S.; Hon. G. C. Brodrick; Hon. George N. Curzon, M.P.; *Sir George D. Taubman Goldie*, K.C.M.G.; General R. Strachey, R.E., C.S.I., F.R.S.; Rear-Admiral W. J. L. Wharton, F.R.S. *Treasurer*: Edward L. Somers Cocks. *Trustees*: Right Hon. Sir John Lubbock, Bart., F.R.S., M.P.; *Cuthbert E. Peek*, F.A.S. *Secretaries*: H. Seebohm, F.L.S.; Major Leonard Darwin, R.E., M.P. *Foreign Secretary*: Sir John Kirk, K.C.B., G.C.M.G., F.R.S. *Councillors*: *W. M. Beaufort*; Robert Brown, M.A., PH.D., F.L.S.; *George Cawston*; Right Hon. Hugh C. E. Childers, F.R.S.; General Sir T. E. Gordon, C.B., K.C.S.I.; Wilfred Hudleston, F.R.S., F.G.S.; Lord Lamington; J. K. Laughton; George Sutherland Mackenzie; Rear-Admiral Albert Hastings Markham; *A. P. Maudslay*; John Murray; Ernest G. Ravenstein; Howard Saunders, F.L.S., F.Z.S.; *Right Hon. the Earl of Scarbrough*; Rear-Admiral E. Hobart Seymour, C.B.; *Major the Hon. M. G. Talbot*, R.E.; Lieut-Colonel J. K. Trotter, R.A.; *General J. T. Walker*, R.E., C.B.; *Admiral Hon. W. J. Ward*; Lieut.-Colonel C. M. Watson, R.E., C.M.G.

The President then delivered his annual address (see p. 1), after which the Hon. G. C. BRODRICK spoke as follows: Ladies and gentlemen, I have been asked to say a few words, and they will be very few, in proposing what you will all anticipate—a vote of thanks to our President for his admirable address. We all remember that when our late President retired, the choice of his successor was a subject of some anxiety. I think we all feel that there are two great qualifications not very often combined in the same individual: a thorough knowledge and sympathy with geography, and, on the other hand, a thorough knowledge of the business of

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* The Medals for the promotion of geographical education, placed by the Society at the disposal of the Syndicates respectively of the Oxford and Cambridge Local Examinations, were awarded as follows:—

1894. Oxford (June).—*Silver Medal*—W. G. Bower. *Silver Medal*—E. W. Wallis. *Silver Medal*—P. Jarrett.

For the bronze medal no candidate of sufficient merit appeared.

Cambridge (December).—*Silver Medal* (Physical Geography)—Samuel Henry Clifford Briggs. *Silver Medal* (Physical Geography)—John Arnold Cherry. *Silver Medal* (Political Geography)—William Gregory Rivers. *Silver Medal* (Political Geography)—John Frame.

The prizes offered by the Society for geographical proficiency to the cadets of the Nautical Training Colleges, on board H.M.S. *Worcester* and *Conway*, were awarded at the examination held in July, 1894, to the following:—*Worcester* training-ship—First prize, to Algernon Percy Le Clerc Faught. Second prize, to Joseph Leonard Hall. *Conway* training-ship—First prize, to Herbert Raymond Bateman. Second prize, to Thomas Samuel Beauchamp Williams.

this Society—a knowledge which can only be obtained by long experience. Well, I am sure I speak the feelings of all present when I say that we find that combination in Mr. Markham to a degree which could not have been equalled by any other man. Some of us can remember Sir Roderick Murchison, and I do not suppose any of us who knew him expected that we should ever find a second Sir Roderick Murchison to preside over us in the Chair. We have had many eminent Presidents since that day, but I have no hesitation in saying that no one of them has come so near possessing the qualifications of Sir Roderick Murchison as our President of to-day. We have heard something of exceptional activity during the past year in the field of geographical exploration, but I am sure that there has been equally exceptional activity in the office of this Society, and the motive power of that activity has been our President. He has thrown life and spirit into the whole work of this Society, and I regard the excellent address we have just heard from him—summarizing so well the geographical work of the past year, and reminding us of the improvements that have been made in the buildings of the Society, and in so many other ways—I regard that address as only another proof of the wonderful and most successful energy which he has brought to bear upon every department of the work of this Society; and therefore I have the greatest pleasure in proposing a vote of thanks to him on this occasion.

Vice-Admiral Sir GEORGE NARES, K.C.B.: I have much pleasure in seconding that resolution.

The PRESIDENT: I have been very much touched by Mr. Brodrick's kindness, and by the way in which he has alluded to my services. I am happy to think, at all events, that you understand that I have worked hard and done my best for the Society. Of course, no one knows better than I do my disqualifications for this post, and I can only feel thankful that you have not yet found them out. I hope that the day when you will do so is far distant. The meeting is now adjourned, and I trust that we shall all meet again at the reception this evening.

Special Meeting, June 6, 1895.—Admiral W. J. L. WHARTON, C.B., F.R.S., Vice-President, in the Chair.

The Paper read was:—

"An Expedition to the Frankincense Country, Southern Arabia." By J. Theodore Bent.

Thirteenth Ordinary Meeting, June 17, 1895.—The Hon. G. N. CURZON, M.P., Vice-President, in the Chair.

ELECTIONS.—*Rev. Edwin J. Frayling; Captain J. James; Captain C. E. Salvesen, R.E.; Cecil Harcourt Smith; Colonel Swinton, R.A.*

The Paper read was:—

"Armenia." By H. F. B. Lynch.

GEOGRAPHICAL LITERATURE OF THE MONTH.

Additions to the Library.

By HUGH ROBERT MILL, D.Sc., *Librarian*, R.G.S.

THE following abbreviations of nouns and the adjectives derived from them are employed to indicate the source of articles from other publications. Geographical names are in each case written in full:—

A. = Academy, Academie, Akademie.
Ann. = Annals, Annales, Annalen.
B. = Bulletin, Bollettino, Boletim.
Com. = Commerce, Commercial.
C. R. = Comptes Rendus.
Erdk. = Erdkunde.
G. = Geography, Geographie, Geografia.
Ges. = Gesellschaft.
I. = Institute, Institution.
J. = Journal.
M. = Mitteilungen.
Mag. = Magazine.
P. = Proceedings.
R. = Royal.
Rev. = Review, Revue, Revista.
S. = Society, Société, Selskab.
Sitzb. = Sitzungsbericht.
T. = Transactions.
V. = Verein.
Verh. = Verhandlungen.
W. = Wissenschaft, and compounds.
Z. = Zeitschrift.

On account of the ambiguity of the words *octavo*, *quarto*, etc., the size of books in the list below is denoted by the length and breadth of the cover in inches to the nearest half-inch. The size of the *Journal* is 10 × 6½.

EUROPE.

Alps—Transverse Valleys. *Z. Ges. Erdk. Berlin* **30** (1895): 1–94. **Futterer.**
Durchbruchsthäler in den Süd-Alpen. Von Dr. Karl Futterer. *With Maps and Profiles.*

France—Beaujolais and Lyonnais. *Ann. G.* **4** (1895): 287–309. **Gallois.**
Mâconnais, Charolais, Beaujolais, Lyonnais; III., le Beaujolais et le Lyonnais. Par M. L. Gallois.
Continuation of a series of papers on regional geography.

France—Languedoc. *B.S. Languedoc. G.* **17** (1894): 187–254. **Malavialle.**
Le littoral du Bas-Languedoc. Par M. L. Malavialle.

France—The Morvan. **Hovelacque and Hervé.**
Mem. S. d'Anthropologie Paris **1** (3 S.) (1894): 1–256.
Recherches éthnologiques sur le Morvan. Par Ab. Hovelacque et G. Hervé. *With Plate.*
This forms an "annexe" to the *Bulletin* of the Paris Anthropological Society.

France—Rhone Delta. *B.S. Languedoc. G.* **17** (1894): 5–23. **Flahault and Combres.**
Observations sur la part qui revient au cordon littoral dans l'exhaussement actuel du Delta du Rhone. Par MM. Flahault et Combres.

Germany—Lorraine. *Deutsche G. Blätter* **18** (1895): 19–35. **Gerdolle.**
Die Wälder Deutsch-Lothringens. Von H. Gerdolle. *With Map.*

Luxemburg. *B. Union G. Nord de la France* **15** (1894): 97–116. **Paillot.**
Le Grande-Duché de Luxembourg et Trèves, conférence faite par M. René Paillot.

Spain. **Luffmann.**
A Vagabond in Spain. By C. Bogue Luffmann. London: John Murray, 1895. Size 8 × 5¼, pp. xvi. and 346. *Frontispiece. Price* 6*s. Presented by the Publisher.*
An entertaining account of a walk of 1500 miles through Spain from Biarritz to Malaga.

Sweden—Norrland. *Globus* **67** (1895): 245–248. **Deecke.**
Skizzen aus Norrland (Nordschweden). Von W. Deecke. Greifswald. *With Illustrations.*

ASIA.

Asia Minor—Railways. *Deutsche Rundschau G.* **17** (1895): 322–323. ——
Die Eisenbahnen Kleinasiens. *With Map.*
The map is on the scale of 1 : 5,800,000.

Barren Island. **Mallet.**
Records Geolog. Surv. India **28** (1895): 22–38.
Some early allusions to Barren Island; with a few remarks thereon by F. R. Mallett.
Bibliography of Barren Island and Narcondam, from 1884 to 1894; with some remarks by F. R. Mallet. *With Illustration.*

Central Asia—Mustagh-ata. *Z. Ges. Erdk. Berlin* **30** (1895): 94–134. **Hedin.**

Die Gletscher des Mus-tag-ata. Von Dr. Sven Hedin. *With Plates.*

Ceylon and India. **Klein.**

Among the Gods, Scenes of India; with Legends by the way. By Augusta Klein. Edinburgh and London: W. Blackwood & Sons, 1895. Size 9 × 6, pp. x. and 356. *Illustrations. Price* 15*s. Presented by the Publishers.*

A typical volume of "light travel," conveying a good deal of information as to the more frequently visited towns and temples of Ceylon and India, and illustrated by excellent photographs.

Russia—Aralo-Caspian Region. **Sjögren.**

Ueber das Diluviale, aralokaspische Meer und die nordeuropäische Vereisung. Von Hj. Sjögren in Baku. [From Jahrbuch der k. k. geol. Reichsanstalt, 1890, 40 Band. 1 Heft.] Size 10½ × 7½, pp. [26]. *Presented by the Royal University of Upsala.*

Russia—Transcaspian Railway. *Ann. G.* **4** (1895): 325–345. **Blanc.**

Le chemin de fer Transcaspien. Par M. Éd. Blanc. *With Sketches.*

CENTRAL AND SOUTH AMERICA.

Brazil—Amazonas. **Leal.**

Viagem a um paiz de selvagens. Por Oscar Leal. Lisbon: Antonio Maria Pereira, 1895. Size 7½ × 5½, pp. 232. *Illustrations. Presented by the Author.*

Ecuador—Galapagos. **White.**

A needed foothold in the Pacific. By Arthur Silva White. From the *United Service Magazine*, September, 1894. Size 9½ × 6, pp. [6].

Mr. Silva White points out the importance of the Galapagos Islands as a point on the new routes across the Pacific.

Paraguay. *J.S. Arts* 43 (1895): 353–364. **Baillie.**

The Republic of Paraguay. By Alexander F. Baillie.

Jamaica. **Musson and Roxburgh.**

The Handbook of Jamaica for 1895. Published by Authority, comprising Historical, Statistical, and General Information concerning the Island. Compiled . . . by S. P. Musson and T. Laurence Roxburgh. London: E. Stanford, 1895. Size 8½ × 6, pp. viii. and 590. *Map. Price* 8*s. Presented by the Publisher.*

This well-known handbook is indispensable as an official record of the geography and statistics of Jamaica.

Spanish West Indies—Porto Rico. **Sievers.**

M.G. Ges. Hamburg, 1891–92 (1895): 217–236.

Zur Kenntniss Puerto Rico's. Von Prof. Dr. Wilhelm Sievers. *With Map.*

Argentine Republic. *B.A. Nac. Córdoba* **14** (1894): 21–54. **Bodenbender.**

La llanura al Este de la sierra de Córdoba. Contribución á la historia del desarrollo de la llanura pampeana. Por Guillermo Bodenbender.

Argentine Republic. *Rev. Museo La Plata* **6** (1894): 1–24. **Valentin.**

Rapido estudio sobre las Sierras de los Partidos de Olavarria y del Azul (Provincia de Buenos Aires). Por el Dr. Juan Valentin. *With Plates.*

Argentine Republic—Cordoba. *B.A. Nac. Córdoba* **14** (1894): 55–92. **Doering.**

La insolacion en Córdoba. Resultados correspondientes al quinquenio 1889–1893. Por Oscar Doering.

Sunshine records at Cordoba.

Bolivia. *Rev. Museo La Plata* **6** (1894): 141–219. **Pando.**

Viaje á la Región de la Goma Elastica (N. O. de Bolivia). Por José Manuel Pando. *With Map.*

Bolivia—Titicaca. *Deutsche G. Blätter* **18** (1895): 100–109. **Copeland.**

Ein Besuch auf der Insel Titicaca. Von Dr. R. Copeland.

British Guiana. **Perkins.**

Notes on British Guiana and its Gold Industry. By H. I. Perkins. January 8, 1895. London: Waterlow & Sons, 1895. Size 13½ × 8½, pp. 24. *Maps and Charts. Price* 1*s. Presented by Messrs. Waterlow & Sons.*

A systematic description of the gold regions of British Guiana, with large-scale maps of the gold districts, showing routes of approach and workings. A brief general description of the colony is prefixed to the more complete description of the special regions. Some useful information for the benefit of intending miners is added.

British Guiana—Roraima. *Timehri* **8** (N.S.) (1894): 297–315. **Schomburgk.**

Richard Schomburgk's Account of Roraima. Translated by Mrs. M. H. von Ziegezar.

Central America—Nicaragua. *Petermann's M.* **41** (1895): 57–66. **Mierisch.**

Eine Reise quer durch Nicaragua, vom Managua See bis nach Cabo Gracias á Dios. Ausgeführt im Jahre, 1893. Von Dr. Bruno Mierisch. *With Map.*

AUSTRALASIA AND PACIFIC ISLANDS.

Australasia. **Coghlan.**

A Statistical Account of the Seven Colonies of Australasia. By T. A. Coghlan. With Map and Diagrams. Sydney: Charles Potter, and E. A. Petherick & Co., 1894. Size 8½ × 5½, pp. 454. *Presented by the Agent-General for New South Wales.*

A new and revised edition.

Australasia. *Nature* **52** (1895): 20–23. **Gregory.**

The Geological Development of Australia. By the Hon. A. C. Gregory.

British New Guinea. *Scottish G. Mag.* **11** (1895): 161–180. **MacGregor.**

British New Guinea. By Sir William MacGregor.

British New Guinea. *J. R. Colonial I.* **26** (1894-95) 1895: 294–325. **Macgregor.**

British New Guinea. By Sir William Macgregor.

The heads treated of this paper are Administration, Legislation, and the Task of the Government.

British New Guinea. **Haddon.**

The Decorative Art of British New Guinea: a Study in Papuan Ethnography. By Alfred C. Haddon. With twelve plates. (Royal Irish Academy. 'Cunningham Memoirs.'—No. X.) Dublin, 1894. Size 13 × 10, pp. 280. *Price* 14*s. Presented by the Royal Irish Academy.*

This fine memoir is handsomely illustrated. Professor Haddon strongly urges the importance of undertaking a careful study of the anthropology of New Guinea and the Pacific Islands, and points out that if this work is to be done at all it must be done soon.

Chatham Islands. *J. Polynesian S.* **3** (1894): 187–198. **Shand.**

The Moriori People of the Chatham Islands: their traditions and history. By Alexander Shand. *With Plate.*

Fiji. *M. G. Ges. Wien* **38** (1895): 1–25. ——

Sclaverei auf den Fiji-Inseln.

Anonymous criticism on the government of Fiji.

Hawaii—Gravity. *American J.S.* **49** (1895): 271–272. **Preston.**

Disturbances in the direction of the Plumb-line in the Hawaiian Islands. By E. D. Preston. *With Map.*

Hawaii—Rainfall. *Meteorologische Z.* 12 (1895): 1–14. **Hann.**

Der Regenfall auf den Hawaii-Inseln. Von J. Hann.

Lord Howe Island. *Petermanns M.* **41** (1895): 72–77. **Vollmer.**

Lord Howe-Insel, Pitcairn und Norfolk-Insel. Von Dr. A. Vollmer.

New Guinea. **Chalmers.**

Pioneer Life and Work in New Guinea, 1877–1894. By James Chalmers. London: the Religious Tract Society, 1895. Size 8 × 5, pp. 256. *Portrait, Map, and Illustrations. Price* 3*s.* 6*d. Presented by the Religious Tract Society.*

This little volume contains reprints of some of Mr. Chalmers' early papers, and, in addition, a considerable amount of new material, showing the same clear insight into native life which has always characterized his accounts of his missionary journeys.

New Zealand. **Buller.**

Illustrations of Darwinism, and other papers. By Sir Walter L. Buller. From *Transactions of the New Zealand Institute*, vol. xxvii. Wellington: S. Costall, 1895. Size 8½ × 5½, pp. [82]. *Plate. Presented by the Author.*

These papers deal with the natural history of New Zealand, and include photographs of the curious "vegetable caterpillar."

Timor. *Tijds. Ned. Aard. Genoots. Amsterdam* (2) **11** (1894): 541, 659, 765. **Ten Kate.**

Verslag eener reis in de Timorgroep en Polynesië. Door Dr. Herman F. C. Ten Kate. *With Map.*

POLAR REGIONS.

Antarctic and Arctic. **Markham.**

Arctic and Antarctic Exploration. By Clements R. Markham, C.B. [In the third Annual Report of the Council of the Liverpool Geographical Society, for year ending December 31, 1894, pp. 25–48.] Size 8¼ × 5½.

Antarctic Exploration. **Petersen.**

Die Reisen des "Jason" und der "Hertha" in das Antarktische Meer 1893-94, und die wissenschaftlichen Ergebnisse dieser Reisen, von Dr. Johannes Petersen, nebst einer Originalkarte des Dirck Gherritz-Archipels mit Begleitworten von L. Friederichsen. Separatabdruck aus den Mittheilungen der Geographischen Gesellschaft in Hamburg, 1891-92, Heft ii. Hamburg: L. Friederichsen & Co., 1895. Size 9 × 6, pp. 62. *Presented by Herr Ludwig Friederichsen.*

A full account of the expeditions already referred to in the *Journal*, and of value in correcting errors which had been made in the hurried translation of the abstract log published in vol. iv. (1894), p. 333 *et seq.* Many of these errors were obviously due to the handwriting of the original abstract.

Bering Strait. *Deutsche G. Blätter* **18** (1895): 109–125. **Hegemann.**

Die Witterungs-, Eis- und Strömungsverhältnisse des Beringsmeeres, der Beringstrasse und des nördlich von letzterer belegenen Eismeeres. Von Kapitän Fr. Hegemann.

Greenland. *G. Tidskrift* **13** (1895–96): 37–47. **Bruun.**

Den arkæologiske Expedition til Julianehaabs Distrikt, 1894. Ved Premierløjtnant i Todfolket Daniel Bruun.

Greenland. *B. American G.S.* **26** (1894): 447–488. **Peary.**

The Cape York Ironstone. By R. E. Peary.

A note in the Monthly Record gives particulars of Mr. Peary's discovery of the source of the meteoric iron of Cape York, first reported by Sir John Ross.

Polar Exploration. **Morris.**

The Problem of the Pole. By Charles Morris. From the *New Science Review*, July, 1894. Size 10 × 6½, pp. 59–76.

Spitzbergen. *Alpine J.* **17** (1895): 297–309. **Conway.**

Spitzbergen. By W. M. Conway.

A general summary of our knowledge of Spitzbergen.

Spitzbergen. *Alpine J.* **17** (1895): 309–316. **Gatty.**

Ice Fiord, Spitzbergen. By Victor H. Gatty. *With Sketch-Map and Two Illustrations.*

Notes of the pleasure-trip of the *Lusitania* to Spitzbergen in August, 1894.

MATHEMATICAL AND PHYSICAL GEOGRAPHY.

Botanical Geography. **Schulz.**

Grundzüge einer Entwicklungsgeschichte der Pflanzenwelt Mitteleuropas seit dem Ausgange der Tertiärzeit. Von Dr. August Schulz. Jena: G. Fischer, 1894. Size 9½ × 6½, pp. 208. *Price* 6 *m.*

Geodesy—Length of Degree. *Deutsche G. Blätter* **18** (1895): 64–75. **Börgen.**

Ueber die Ausführung einer Gradmessung im hohen Norden. Von Dr. C. Börgen.

Supporting the proposal for exact measurements of the value of the degree in high northern latitudes, either in East Greenland or in Spitzbergen.

Geographical Tables. **Woodward.**

Smithsonian Miscellaneous Collections, 854. Smithsonian Geographical Tables. Prepared by R. S. Woodward. Washington: the Smithsonian Institution, 1894. Size 9½ × 6½, pp. cv. and 182. *Presented by the Smithsonian Institution.*

These valuable tables are an enlargement of the geographical section of Guyot's Meteorological Tables. The first part deals with Useful formulas, Mensuration, Units, Geodesy, Astronomy, Theory of Errors, and Explanation and Source of Tables. The second part contains tables for the most important geographical calculations in measurement and map-construction.

Land and Sea. **Wagner.**

On the areas of the Land and Water of the Globe. A new calculation by zones of ten degrees of latitude. By Professor Hermann Wagner. From the *Scottish Geographical Magazine* 11 (1895): 185–189. *Presented by the Author.*

This will be specially noticed.

Latitude Changes. *C.R.* **120** (1895): 592–595. **Gonnessiat.**

Sur les variations des latitudes terrestres. Note de M. F. Gonnessiat.

The observations described were made at the Observatory of Lyons.

Map-projections. **Fiorini.**

Prof. Matteo Fiorini. Sopra una speciale transformazione delle projezioni cartografiche atta alla delineazione dei Mappamondi Roma, 1895. Size 9 × 6, pp. 14. *Presented by the Author.*

Meteorology. *B. S. Languedoc G.* **17** (1894): 24–35, 132–186. **Duponchel.**

La circulation des vents et de la pluie. Par M. Duponchel.

Mountains. *Nat. Science* **6** (1895): 240–243. **Marr.**

Forms of Mountains. By J. E. Marr.

Oceanography—Areometer. *Ann. Hydrographie* 22 (1894): 415–427. **Krümmel.**

Ueber einige neuere Beobachtungen an Aräometern. Von Prof. Dr. O. Krümmel in Kiel.

Oceanography—Areometer. *Rev. Maritime et Colon.* **124** (1895): 696–707. **Thoulet.**

De l'utilité de la mesure des densités en océanographie et d'un nouveau modèle d'aréomètre à eau de mer. Par M. J. Thoulet.

Oceanography—Currents. *Ann. G.* **4** (1895): 257–270. **Thoulet.**

Quelques considérations générales sur l'étude des courants marins. Par M. Thoulet.

Oceanography—Refractometer. *Ann. Hydrographie* **22** (1894): 241–249. **Krümmel.**

Das Doppelbild-Refraktometer zur Bestimmung des Specifischen Gewichts des Seewassers auf optischem Wege. Von Prof. Dr. O. Krümmel in Kiel. *With Illustrations.*

This valuable oceanographical instrument has already been noticed in the *Journal*, vol. iv. (1894), p. 570.

Oceanography—Soundings.

Soundings taken by the India Rubber, Gutta Percha, and Telegraph Works Company, Limited, 1890–1893. Central and South American Cables Expedition, 1890–91. Central and South American Duplicate Cables Expedition, 1893. Size 8½ × 5½, pp. 18.

Ditto, 1889–1894. Third West African Expedition, 1889. Western and Brazilian Cables Expedition, 1891. Off the coast of Brazil, and on Voyage home, 1884. Brazilian and African Cables Expedition, 1891. South American Cable Company's Expedition, 1892. South American Cable Repairs, 1893. Ceuta-Gomera Cable Expedition, 1894. Size 8½ × 5½, pp. 28. *Presented by the Company.*

Photographic Surveying. *Rev. Maritime et Colon.* **124** (1895): 579–594. **Lancelin.**

De l'utilisation en hydrographie des clichés photographiques obtenus au moyen d'appareils à main. Par M. Lancelin.

Photographic Surveying. *C.R.* **120** (1895): 651–653. **Thoulet.**

Sur une application de la Photographie à l'océanographie. Note de M. J. Thoulet.

Professor Thoulet proposes to map shifting sandbanks which are partially exposed at low water, by photographing the bank from a height at different phases of tide, so securing a series of contour-lines at any desired closeness of vertical interval.

Physical Geography. **Shaler.**

Sea and Land. Features of Coasts and Oceans, with special reference to the Life of Man. By N. S. Shaler. London: Smith, Elder & Co., 1895. Size 9½ × 6½, pp. xiv. and 252. *Illustrations. Price* 10*s.* 6*d.*

A collection of magazine articles and abstracts of Geological Survey memoirs, put together with the object of introducing "unprofessional students of nature to certain interesting phenomena of the sea-shore and of the depths of the ocean." This it seems well fitted to effect. The chapters are entitled respectively Sea and Land, Sea-Beaches, The Depths of the Sea, Icebergs, Harbours and Civilization, The Formation and Preservation of Harbours, Tidal Currents and Organic Life in Harbours.

Physical Geography. **Klein.**

Jahrbuch der Astronomie und Geophysik. Enthaltend die wichtigsten Fortschritte auf den Gebieten der Astrophysik, Meteorologie und physikalischen Erdkunde, Unter Mitwirkung von Fachmännern herausgegeben von Dr. Hermann J. Klein. V. Jahrgang 1894. Leipzig: E. H. Mayer, 1895. Size 9 × 6, pp. x. and 352. *Map and Plates.*

GENERAL.

Bibliography. **Baschin.**

Bibliotheca Geographica herausgegeben von der Gesellschaft für Erdkunde zu Berlin bearbeitet von Otto Baschin unter mitwirkung von Dr. Ernst Wagner. Band I. Jahrgang 1891 und 1892. Berlin: W. H. Kühl, 1895. Size 9½ × 6, pp. xvi. and 506.

Special notice of this bibliography will be given.

Biography—Baker. **Murray and White.**

Sir Samuel Baker, a Memoir. By T. Douglas Murray and A. Silva White. London: Macmillan & Co., 1895. Size 9 × 6, pp. xii. and 448. *Portrait, Maps, and Illustrations. Price* 21*s. Presented by the Publishers.*

This is noticed on p. 73.

Biography—Dana. *American J. Science* (3 S.) **49** (1895): 329–356. ——

James Dwight Dana. *With Portrait.*

Biography—Empress Leonora. **Cordeiro.**

Portuguezes fóra de Portugal. Uma Sobrinha do Infante Imperatriz da Allemanha e Rainha da Hungria por Luciano Cordeiro. Lisboa: Imprensa Nacional, 1894. Size 10 × 6½, pp. 222.

Biography—Franklin. **Smith.**

Sir John Franklin and the Romance of the North-West Passage. By G. Barnett Smith. London: S. W. Partridge & Co., [1895]. Size 7½ × 5, pp. 160. *Price* 1*s.* 6*d. Presented by the Publishers.*

A popular account of Franklin's life and work appearing appropriately at the commemoration of his last voyage, on which he started fifty years ago.

Biography—Ismail Pasha. ——

Société Khédiviale de Géographie. Hommage à la mémoire de S. A. le Khédive Ismail Pacha, fondateur de la Société. Séance solennelle du mars 1895. Cairo, 1895. Size 9½ × 6½, pp. [44]. *Portrait.*

Biography—Pâris. *C.R.* **120** (1895): 473–484. **Guyon.**

Notice sur la vie et les travaux de M. l'amiral Pâris. . . . Par M. E. Guyon.

Biography—Pouchet. *Rev. Scientifique* (4) **3** (1895): 258–261. **Retterer.**

Biographies scientifiques. Georges Pouchet. Par M. Ed. Retterer.

Biography—Rennell. **Markham.**

The Century Science Series. Major James Rennell and the Rise of Modern English Geography. By Clements R. Markham, C.B., etc. London: Cassell & Co., 1895. Size 7½ × 5, pp. 232. *Portrait. Price* 3*s.* 6*d. Presented by the Publishers.*

Starting with the dictum that Major Rennell was the first and greatest of Englis.. geographers, Mr. Markham traces the training and development of the geographical powers of the subject of his memoir, and shows how the present position of geography in this country is a direct outcome of Rennell's influence.

Biography—Vasco da Gama. **Cordeiro.**

Sociedade de Geographia de Lisboa. Descobertas e Descobridores. De como e quando foi feito conde Vasco da Gama. Memoria apresentada á 10ª sessão do Congresso Internacional dos Orientalistas por Luciano Cordeiro. Lisboa: Imprensa Nacional, 1892. Size 10 × 6½, pp. 54. *Facsimiles.*

Biography—Walker. ——

Days of a Soldier's Life. Being letters written by the late General Sir C. P. Beauchamp Walker, K.C.B., during active service in the Crimean, Chinese, Austro-Prussian (66), and Franco-German (70–71) Wars. With Portrait. London: Chapman and Hall, 1894. Size 9 × 6, pp. 412. *Price* 18*s.*

The late Sir Beauchamp Walker, of whom this volume is practically the autobiography, was for many years a member of the Council of the Royal Geographical Society, and the Foreign Secretary of the Society.

Biography—Weinek. *Deutsche Rundschau G.* **17** (1895): 325–327. ——

Professor Dr. L. Weinek. *With Portrait.*

Biography—Xántus. *Deutsche Rundschau G.* **17** (1895): 327–330. **Palóczy.**

Johann Xántus. By Prof. L. Palóczy. *With Portrait.*

Book of Reference—Spanish Academy. ——

Anuario de la Real Academia de Ciencias Exactas, Fisicas y Naturales, 1895. Madrid: Imp. de L. Agnado. Size 4½ × 3½, pp. 288.

Book of Reference—Statesman's Year-Book. **Keltie and Renwick.**

The Statesman's Year-Book. Statistical and Historical Annual of the States of the World for the year 1895. Edited by J. Scott Keltie with the assistance of I. P. A. Renwick. Thirty-Second Annual Publication. London: Macmillan & Co., 1895. Size 7½ × 5, pp. xxxii. and 1156. *Price* 10*s.* 6*d.* *Presented by the Author.*

The thirty-second annual publication of this indispensable year-book contains, in addition to the statistics of all nations, a new series of Tables, giving particulars of the value of silver from 1858 to 1894, the wheat crops of the World, the navies of the World, the World's shipping, the railways of Europe, and the British empire.

Bremen Geographical Society. *Deutsche G. Blätter* **18** (1895): 5–11. **Lindeman.**

25 Lebensjahre der geographischen Gesellschaft in Bremen. Von Dr. M. Lindeman.

British Empire. **Paul.**

A short view of Greater Britain: showing the date of acquisition of the various British Dependencies, with their relative grouping and geographical distribution, so as to illustrate the progressive Colonial Expansion of the Empire. By Arthur Paul. London: Sonnenschein & Co., 1895. Size 14 × 11. *Price* 1*s.*

A diagram in one sheet.

British Trade. **Whitehead.**

The Critical Position of British Trade with Oriental Countries. By T. H. Whitehead. A paper read before the Royal Colonial Institute, February 12, 1895. Size 8½ × 5½, pp. 44. *Presented by the Author.*

The effect of the depreciation of silver, the competition of native labour in India, and the development of manufactures in Japan are discussed in their bearing on British trade in the East.

Cartographical Exhibition. ——

Katalog einer Mercator-Ausstellung im Lesesaale der Kölner Stadtbibliothek, Portalsgasse 1. Cologne, 1894. Size 10 × 6½, pp. 10.

Coast-Photography. *Ann. Hydrographie* **22** (1894): 340–343. **Talbot.**

Photographische Küstenaufnahmen. Von Robert Talbot. *With Illustrations.*

Hints on the taking of useful photographs from a ship of the coast.

Commercial Geography—Meat Supply. *J.S. Arts* **43** (1895): 420–429. **Nelson.**
The Meat Supply of the United Kingdom. By E. Montague Nelson.
A history of the trade in live animals and dead meat, with statistics of its growth and present condition.

Geographical Society of Geneva. **Claparède.**
Rapport sur la marche et l'activité de la Société de Géographie de Genève pendant l'exercice 1893–1894. Lu à l'ouverture de la XXXVII^me^ session annuelle de la Société le vendredi 16 novembre 1894. Par Arthur de Claparède, Président. Geneva: Imp. Aubert-Schuchardt, 1895. Size 9½ × 6, pp. 30. *Presented by the Author.*

Geography—General. *B.G. Club Philadelphia* **1** (1894–95): 85-120. **Heilprin.**
The Progress of Discovery and the Lands of Promise to the Explorer. By Prof. Angelo Heilprin.
The Geographical Club of Philadelphia now issues a well-arranged bulletin, the first number of which for the current session contains the address of the President of the Club.

German Colonies. **Meinecke.**
Koloniales Jahrbuch. Beiträge und Mittheilungen aus dem Gebiete der Kolonialwissenschaft und Kolonialpraxis. Herausgegeben von Gustav Meinecke. Achter Jahrgang. Heft 1–2. Berlin: Carl Heymanns Verlag, 1895. Size 9½ × 6½, pp. 160. *Portrait.*

German Colonies. ———
Weissbuch. Vierzehnter und Fünfzehnter Theile. Berlin: Carl Heymanns Verlag, 1895. Size 12 × 8½, pp. 206 and 156.
Part 14 contains reports on the protectorate of South-West Africa, including a long paper by Dr. Hindorf on its economic value, and on the Marshall islands. Part 15 contains numerous reports on German East Africa, and also short reports on the Cameroons and Togo-land.

Historical—Sea-Charts. **Wagner.**
XI^ter^ Deutscher Geographentag in Bremen 1895. Leitfaden durch den Entwickelungsgang der Seekarten, vom XIII.–XVIII. Jahrhundert oder bis zur allgemeinen Einführung der Mercatorprojektion und der Breitenminute als Seemeile. An der Hand der Ausstellung 1895 dargestellt von Hermann Wagner. Bremen: Druck von Carl Schünemann. Size 9 × 6, pp. 36. *Presented by the Author.*

Prospector's Handbook. **Anderson.**
The Prospector's Handbook. A Guide for the Prospector and Traveller in search of metal-bearing or other valuable minerals. By J. W. Anderson. Sixth Edition. London: Crosby Lockwood and Son, 1895. Size 7 × 5, pp. xii. and 176. *Illustrations. Presented by the Author.*
The present edition has been revised, and is printed and bound in a manner adapting it for ready reference in the field.

Travels in America and Asia. **Stanley.**
My Early Travels and Adventures in America and Asia. By Henry M. Stanley, D.C.L. 2 vols. London: Sampson Low and Co., 1895. Size 8 × 5½, pp. (vol. i.) xxii. and 302; (vol. ii.) x. and 424. *Maps and Portraits. Price* 12*s.* 6*d. Presented by the Publishers.*
The first volume of this intensely interesting work contains an account of Mr. Stanley's early adventures with the Indians of the Western States, during the operations of the United States troops during 1867. The second volume contains an account of travels in Asia during 1869 and 1870, before the search for Livingstone, containing an account of the opening of the Suez Canal, a visit to Philæ, Jerusalem, and a journey from Constantinople, across by Tiflis, to Baku, and thence to and through Persia.

NEW MAPS.

By J. Coles, *Map Curator*, R.G.S.

EUROPE.

England and Wales. **Ordnance Survey.**
Publications issued since May 8, 1895.

1-inch—General Maps:—
ENGLAND AND WALES:—164, engraved in outline, 1*s.*

6-inch—County Maps:—

ENGLAND AND WALES:—**Lancashire,** 48 N.W., 50 N.E., 52 S.E., 53 N.W., S.E., 56 N.W., N.E., 57 N.E., 61 N.W., 118 N.W. **Yorkshire,** 9 S.W., 20 S.W., 31 N.W., 32 N.E., 33 S.W., 43 N.E., 46 S.W., S.E., 47 N.W., S.E., 59 S.W., S.E., 60 S.E., 61 N.W., N.E., 70 S.E., 71 N.E., S.E., 72 N.E., S.W., S.E., 73 N.W., N.E., S.E., 74 N.E., 77 S.E., 78 N.W., 87 S.E., 88 N.E., S.E., 89 S.W., 90 N.W., N.E., 104 N.E., 138 S.W., S.E., 139 S.W., S.E., 155 N.W., 156 S.W., 172 S.W., S.E., 173 N.W., N.E., S.W., 185 S.W., 189 N.W., 202 N.E., S.E., 216 N.E., 271 S.E., 1*s.* each.

25-inch—Parish Maps:—

ENGLAND AND WALES:—**Yorkshire,** VIa. 12, 3*s.*; VIb. 16, 11*s.* 6*d.* (coloured).

Town Plans—5-feet scale:—

London—Re-survey, IV. 32; VI. 40, 47, 57, 58, 67, 96, 99, 100; VIII. 43, 76; X. 1, 5, 11, 12, 14, 21, 44, 45, 57, 2*s.* 6*d.* each.

——— 10-feet scale:—

Hornsey, II. 50, 4, 2*s.* 6*d.*; III. 52, 1, 2*s.* 6*d.*

(*E. Stanford, Agent.*)

Germany. **K. Kanal-Kommission in Kiel.**

Officielle Karte vom Nord-Ostsee-Kanal bearbeitet von der Kaiserlichen Kanal-Kommission in Kiel. Scale 1 : 100,000 or 1·7 stat. mile to an inch. Verlag von Max Pasch, Berlin. *Presented by R. H. Porter, Esq.*

The fact that the opening of the canal connecting the North and Baltic Seas is at the present time attracting a great deal of attention, invests this map with a certain amount of interest. It is evidently taken from the German Government map on the scale of 1 : 100,000, on which the canal has been laid down. At the foot of the map sections are given showing the depth of the canal, and the elevation of the adjacent land.

Scotland. **Johnston.**

W. and A. K. Johnston's "Three Miles to Inch" Map of Scotland. Scale 1 : 190,080 or 3 miles to 1 inch. W. & A. K. Johnston, Edinburgh and London, 1895. Sheet 6. *Price of each sheet,* 1*s. unmounted;* 1*s.* 6*d. mounted. Presented by the Publishers.*

This is the first sheet that has appeared of a series of reductions from the Ordnance Survey of Scotland, on the scale of three miles to an inch. It is printed in colours, contour-lines, names of hills and main roads in brown, water in blue, and parks in green. The map is very neatly drawn, and when completed the series will consist of fifteen sheets.

ASIA.

Siam. **Morant.**

Siam and her Neighbours. Scale 1 : 3,000,000 or 47·3 stat. miles to an inch. Edited and compiled from the best and most authentic sources by Robt. L. Morant, M.A. Oxford, Tutor to H.R.H. the Crown Prince. Drawn and executed under the immediate supervision of Lieut. de Richlieu of H.S.M.'s Survey Department, Bangkok. *Presented by Robt. L. Morant, Esq., M.A.*

This map which has been completed by Mr. R. L. Morant for the use of schools in Siam has been lithographed by Mr. F. S. Weller in three different styles. The first shows only the rivers and boundaries, in the second hills are added, and the third is a complete general map with the names of places in Siamese characters. The bold style in which these maps have been produced is well suited to the purpose for which they have been published.

Tabriz. **Tabriz Military College.**

Plan of Tabriz, from surveys by pupils of the Military College at Tabriz in 1880. Published 1894. Scale (approx.) 1 : 8,820 or 7·2 stat. miles to an inch. Persian characters. *Presented by General A. Houtum-Schindler.*

The surveys from which this map has been made were carried out by the Persian students of the Military College of Tabriz, under the direction of Mirza Ghias Khan, chief of the college, and the draughtsman's work was done by Muhammed Reza Khan. The map is a very good specimen of cartography.

AFRICA.

Algeria. **Service Géographique de l'Armée, Paris.**

Carte de l'Algérie. Scale 1 : 50,000 or 1·26 inch to a stat. mile. Service Géographique de l'Armée, Paris. Sheets Nos. 37, Cap Ténès; 59, Ténès; 72, Radjas Ferada; 108, Pont du Kaïd. *Price* 1 *fr.* 50 *c. each sheet.*

North-East Africa. **Chaurand.**

Carta dimostrativa della Etiopia. Compilata dal Capitano di Stato Maggiore Enrico de Chaurand. Scale 1 : 1,000,000 or 15·7 stat. miles to an inch. Laboratorio foto-litografico del Ministero della Guerra. 7 sheets. *Price of complete map,* 13 *lire. Presented by the Comando del Corpo di Stato Maggiore, Roma.*

With the publication of these sheets, this map is complete. Great pains have been taken in the compilation, and it is the best general map of the country it includes, that has been published.

AMERICA.

Guatemala. **Sapper.**

Kartenskizze der Vulkane in West-Guatemala. Von Dr. Carl Sapper. Petermann's 'Geographische Mitteilungen,' 1895. Tafel 7. Justus Perthes, Gotha. *Presented by the Publisher.*

South America. **Delachaux.**

Übersichtskarte des Erdbebens vom 27 Okt. 1894, in Süd-Amerika. Nach einer Skizze von Enrique Delachaux. Scale 1 : 7,500,000 or 118 stat. miles to an inch. Petermann's 'Geographische Mitteilungen,' Jahrgang 1895. Tafel 8. Justus Perthes, Gotha. *Presented by the Publisher.*

GENERAL.

The World. **Saint Martin and Schrader.**

Atlas universel de géographie construit d'après les sources originales et les documents les plus récents cartes, voyages, mémoires, travaux géodésiques, etc., avec un texte analytique. Ouvrage commencé par M. Vivien de Saint-Martin et continué Fr. Schrader. No. 58, Afrique en 3 feuilles Feuille N. O. Paris: Librairie Hachette et Cie., 1895. *Price* 2 *fr. each sheet.*

This is another sheet of what promised to be one of the best atlases ever published, but such a length of time has elapsed since it was commenced, that many of the maps which have previously appeared are out of date. This is the more to be regretted as they are, like the present sheet, beautifully executed.

The World. **"The Times."**

The Times Atlas. Complete in fifteen weekly parts. Published at the *Times* Office, London. Parts 6, 7, 8, 9. *Price* 1*s.* each part. *Presented by the Publishers.*

The present issues of this atlas contain the following maps:—Part No. 6—Africa South of the Equator, Denmark, Alsace-Lorraine and the Palatine of Bavaria, France General (double page), United States Western and North-Eastern. Part No. 7—Palestine, Asia Minor and Persia, British Isles (double page), British North America (double page), Polynesian Groups, South Polar Regions, New Guinea and Papuan Archipelago. Part No. 8—South America (double page), Hungary, Bohemia, Moravia and Austrian Silesia, Italy General (double page), Canada Eastern and Western. Part No. 9—Africa General (double page), Central America and West Indies, the Antilles, Kingdom of Saxony, Thuringian States, Italy North, Ethnographic Map of the Balkan Peninsula, Constantinople, and the Sea of Marmora. In addition to the principal maps, numerous insets are given.

CHARTS.

Admiralty Charts. **Hydrographic Department, Admiralty.**

Charts and Plans published by the Hydrographic Department, Admiralty, March and April, 1895. *Presented by the Hydrographic Department, Admiralty.*

No.	Inches.	
2352	m = 0·97	France, west coast:—Presqu' île de Quiberon to anse de Benodet. 2*s.* 6*d.*
2428	m = 1·48	Balearic islands, Majorca:—Dragonera island to Carril bay, including Palma bay. 2*s.* 6*d.*
2063	m = 4·0	Mediterranean:—Malta island, northern portion. 3*s.* 6*d.*
2623	m = 4·0	Malta:—Comino channels. 1*s.* 6*d.*
335	m = 5·94	Plans on the north coast of South America:—Carenero harbour. 1*s.* 6*d.*
2417	m = 0·97 m = 2·00	Central America:—Columbia bay, Mandinga harbour. 1*s.* 6*d.*
535	m = 0·53	Brazil:—San Marcos or Maranham bay and approaches. 2*s.* 6*d.*

2346 m = various. Plans on the coast of Chile:—Lantaro cove, Tames bay, Coloso cove, Colorado cove. 1*s.* 6*d.*

1357 m = 0·12 Africa, west coast:—River Benin to river Cameroon, including the mouths of the river Kwara or Niger. 2*s.* 6*d.*

701 m = 1·2 Madagascar, north-west coast:—Bombetoke bay, and delta of the Betsiboka river. 2*s.* 6*d.*

675 m = 12·0 Red sea:—Trinkitat harbour. 1*s.* 6*d.*

866 m = various. Plans on the west coast of Sumatra:—Simalafeh and Siberut bays, Bunga bay, Hurlock bay, Siuban bay, Kawur or Sambat bay, Semebaai bay, Pulo Pisang harbour, and Kroé road. 1*s.* 6*d.*

2465 m = various. Plans of anchorages in Serwatti and Tenimber islands:—Rumah Kuda bay and Nusa Mitan, Babar strait, Tepa road, Batu Merah anchorage, Nika anchorage, Wattewah road, Ritabel bay, Wailutu road, Sabiani anchorage, Egeron strait. 1*s.* 6*d.*

1371 m = 0·42 China sea:—Anamba islands. 2*s.* 6*d.*

2099 m = 0·73 Borneo:—North-western part of Sibuko bay. 2*s.* 6*d.*

507 m = 0·93 Japan:—Go yo mai channel to Yezo strait, including Nemoro, Notsuke, and Tomari anchorages. 2*s.* 6*d.*

995 m = 2·9 Japan:—Susaki harbour and Nomi ura. 1*s.* 6*d.*

2601 m = 0·5 Solomon Islands, New Georgia:—Wana wana to Mbulo island. 2*s.* 6*d.*

1871 Ports Surbi and Mijella:—Plan added: port Vathudi.

1734 St. Julien island to Hooping harbour:—Plan added: Silver cove.

912 Anchorages in islands off the north-west part of New Guinea:—Plans added: Saonek anchorage, Moreha road.

1269 Saïgon or Don-nai river:—New plan: Coral bank in Saïgon river.

259 Fusan harbour, etc.:—New plan: Commemoration bay.

2405 Kuril islands from Nipon to Kamchatka:—Plans added: Tokolan bay, Rubetsu bay.

2128 Plans of the Kuril islands:—Plans added: Moyoro bay, Paramushiru strait, Kuril strait and Paramushiru strait.

(*J. D. Potter, Agent.*)

Charts Cancelled.

No.	Cancelled by	No.
344 Port of Tarragona.	New Chart. Port of Tarragona	344
330 Lake and river St. Clair.	New Chart. Lake and river St. Clair, with the Detroit river	330
1297 San Andres bay. 1317 Port Otway. 1338 Vallenar road. 563 Port St. Domingo. 564 Piti Palena inlet. 1296 Low, Melinka, and Inner ports.	New Chart. Plans on the coast of Chile	1296
575 Port Huasco. 578 Arica road. 1302 Port Caldera and Yugles, Port Flamenco, Pan de Azúcar anchorage, Lavata bay. 1315 Port Copiapó, Pajonal cove, Herradura de Carrizal, Chañeral de las Animas bay, Totoralillo bay.	New Chart. Plans on the coast of Chile	1302
2760 Plan of Tabujong road on this sheet.	New Plan. Tabujong road on sheet	855
934 Beliling road (part of plan of Beliling and Sangit roads) on this sheet.	New Plan of Buleleng road on same sheet	934
2415 Nagasaki harbour.	New Chart. Nagasaki harbour	2415

628 Plan of Kwoibo river on this sheet.

2623 Comino channels.
New Chart.
Comino channels 2623

396 Plan of Candelaria bay on this sheet.
New Chart.
Columbia bay, Mandinga harbour . 2417

535 San Marcos or Maranham bay.
New Chart.
San Marcos or Maranham bay and approaches 535

1357 Cape Formoso to Fernando Po.
New Chart.
River Benin to river Cameroon . 1357

701 Bembatooka bay.
New Chart.
Bombetoke bay, and delta of the Betsiboka river. 701

675 Trinkitat harbour.
New Chart.
Trinkitat harbour 675

866 Se Labba, Seuban, Hurlock bays.
871 Kawur or Sambat.
872 Pulo Pisang harbour and Kroé roads.
New Chart.
Plans on the west coast of Sumatra 866

1371 Anamba islands.
New Chart.
Anamba islands 1371

991 Plan of Notske anchorage on this sheet.
New Chart.
Go yo mai channel to Yezo strait . 507

1268 Plan of Tomari bay on this sheet.

995 Susaki and Nomi harbour.
New Chart.
Susaki harbour and Nomi ura . . 995

2128 Plan of Kuril strait and Little Kuril strait on this sheet.
New Plan of Kuril strait and Paramushiru strait on same sheet 2128

300 Devil bay to Conteau bay.

912 Plan of Ansus harbour on this sheet.

Charts that have received Important Corrections.

No. 2268, England, south coast:—Portland harbour. 2255, England, south coast:—Weymouth and Portland. 2393, England, west coast:—Milford haven. 1772, Ireland, south coast:—Approaches to Wexford harbour. 2295, Norway, west coast:—Trondhjem bay. 2842B, Baltic sea. 2372, Baltic:—Liban to Lyserört. 2373, Baltic:—Gulf of Riga. 2263, Baltic:—Entrance to gulf of Riga. 2692, North America, east coast:—Louisburg harbour. 2806, North America, east coast:—Charleston harbour. 1523, Ports and anchorages on the north coast of South America. 1301, Plans on the coast of Chile. 586, South America, west coast:—Guayaquil river. 2885, North America, west coast:—San Diego bay, Santo Tomas anchorage. 580, Vancouver island:—Strait of Georgia, sheet 2. 579, Vancouver island:—Strait of Georgia, sheet 1. 1003, Africa, east coast:—River Pungue. 2737, India, west coast:—Viziadrug to Cochin. 2760, Sumatra, west coast:—Acheh head to Tyingkok bay. 2761, Sumatra, west coast:—Tyingkok bay to the strait of Sunda. 1964, China, east coast:—Mirs bay. 1199, China, east coast:—Kueshan islands to the Yang tse kiang. 1256, China, north-east coast:—Pe chili and Liau tung gulfs. 532, Japan:—Simonoseki strait. 452, Japan:—Yezo island. 107, Japan:—Matoya harbour. 2354, Australia, north-east coast:—Cape Grenville to Booby island. 2919, Australia, north-east coast:—Cape Grenville to cape York. 2920, Australia, north-east coast:—Cape Direction to Cape Grenville. A. to P. Index Charts, sixteen sheets. 2061, White sea:—Approaches to Kem. 2298, Gulf of Bothnia:—Sheet iii., Nystad light to Stor Fiärd. 870, Gulf of Finland:—Wormsö sound. 1229, Africa, west coast:—Santa Cruz to cape Bojador. 283, Newfoundland:—Codroy road to Cow Head harbour. 2775, 2777 to 2787, River St. Lawrence:—Quebec to Montreal (these twelve charts have been corrected and reissued, and the number of Sheet xiii. has been altered to 2788). 19, South America, east coast:—Santos harbour. 1499, Alaska:—Cross sound to Kadiak island. 1500, Aleutian islands:—Kadiak island to Siguam island. 1421, Africa, east

coast:—River Chinde. 648, Africa, east coast:—Delagoa bay to river Zambezi. 358, Japan:—The western coasts of Kiusiu and Nipon, including the Korea strait. 992, Japan:—Akishi bay. 83, Japan:—Channels between Misima nada and Iyo nada. 2405, Russian Tartary:—Kuril islands from Nipon to Kamchatka. 1430, Russian Tartary:—Slavianski bay (port Bruce). 2650, Russian Tartary:—Strait of Tartary and the entrance of the Amur river.
J. D. Potter, agent.

Pilot Charts. **U.S. Hydrographic Office.**

Pilot Charts of the North Atlantic for April and May, 1895, and North Pacific Oceans for April, May, and June, 1895. Published monthly at the Hydrographic Office, Washington, D.C., Charles D. Sigsbee, Commander U.S. Navy, Hydrographer. *Presented by the U.S. Hydrographic Office.*

Red Sea. **Meteorological Office.**

Meteorological Charts of the Red Sea. Published by the Authority of the Meteorological Council, London. Printed for Her Majesty's Stationery Office, by Eyre & Spottiswoode, 1895. *Price* £1 1*s*. *Presented by the Meteorological Office.*

This atlas contains a series of meteorological charts of the Red Sea. The first twelve sheets show the winds, barometer, and air-temperature for each month of the year, with explanatory notes; and remaining sheets are devoted to currents, specific gravity, and sea-temperature for each month. The charts have been constructed from information furnished by Her Majesty's ships, the logs of the Peninsular and Oriental Steam Navigation Company, and from observations supplied by the Royal Meteorological Institute of the Netherlands. Very few observations have been obtained prior to the opening of the Suez Canal in 1869, and nearly all material which has been used is from steamships which follow much the same track within very narrow limits.

PHOTOGRAPHS.

Central Asia. **Hanbury.**

Album containing 75 photographs of Eastern Turkestan and the Taghdumbash Pamir, taken by David T. Hanbury, Esq., in 1893. *Presented by David T. Hanbury, Esq.*

This album contains a very interesting set of photographs illustrating the scenery and dwellings of Eastern Turkestan and the Taghdumbash Pamir. There are also a large number of photographs which will be of special interest to sportsmen, such as Turki natives hunting with trained golden eagles, heads of Ovis Poli rams, sporting trophies, etc. Considering the difficult circumstances under which these photographs were taken, they are remarkably good.

Himalayas. **Whitehouse.**

Eight Photographs of the Himalayas of Garhwal and Kumaon (Nandi Devi District), taken by Lieut. B. Whitehouse, R.N., in October, 1894. *Presented by Lieut. B. Whitehouse, R.N.*

These are excellent specimens of amateur photography, and have been well chosen to illustrate the scenery and physical features of Garhwal and Kumaon.

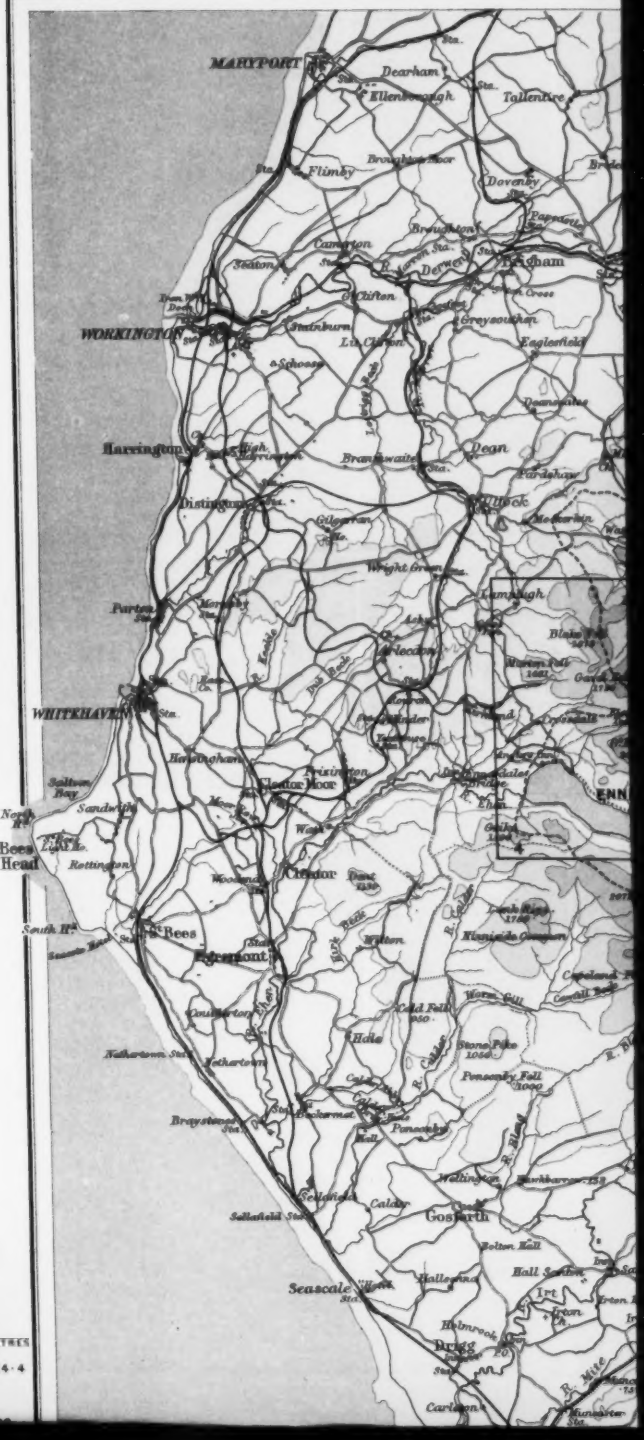
Tibet, etc. **Rockhill.**

121 Photographs of Western China, Tibet, etc., taken by W. W. Rockhill, Esq., in 1892. *Presented by W. W. Rockhill, Esq.*

This series of photographs, which were taken by Mr. W. W. Rockhill during his travels in 1892, in Western China and Tibet, form a valuable addition to the Society's collection, as illustrating scenery and incidents of a journey through a region which has seldom been visited by Europeans.

N.B.—It would greatly add to the value of the collection of Photographs which has been established in the Map Room, if all the Fellows of the Society who have taken photographs during their travels, would forward copies of them to the Map Curator, by whom they will be acknowledged. Should the donor have purchased the photographs, it will be useful for reference if the name of the photographer and his address are given.

MAP I



HEIGHT OF LAND IN FEET

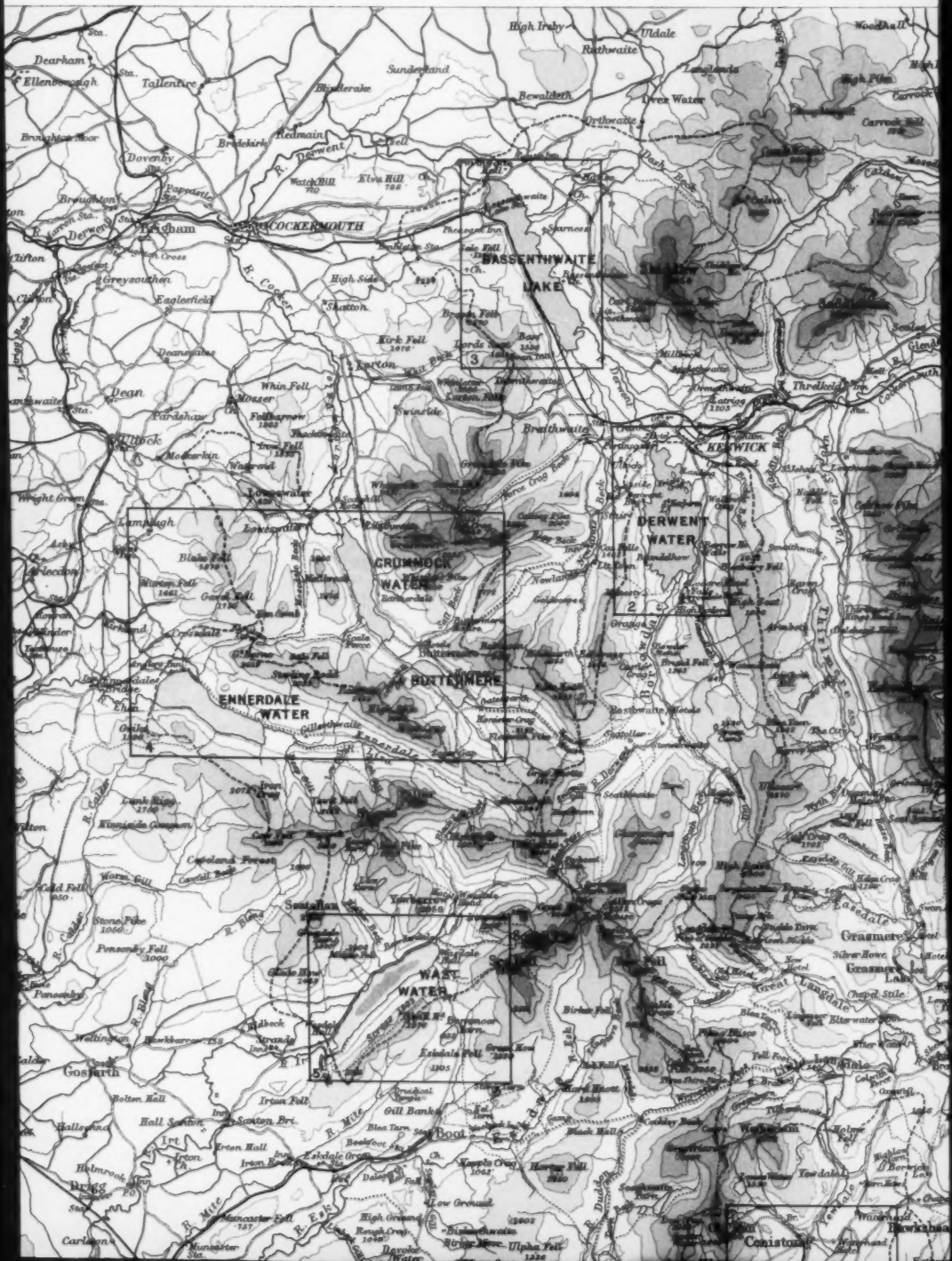
SCALE OF COLOURS

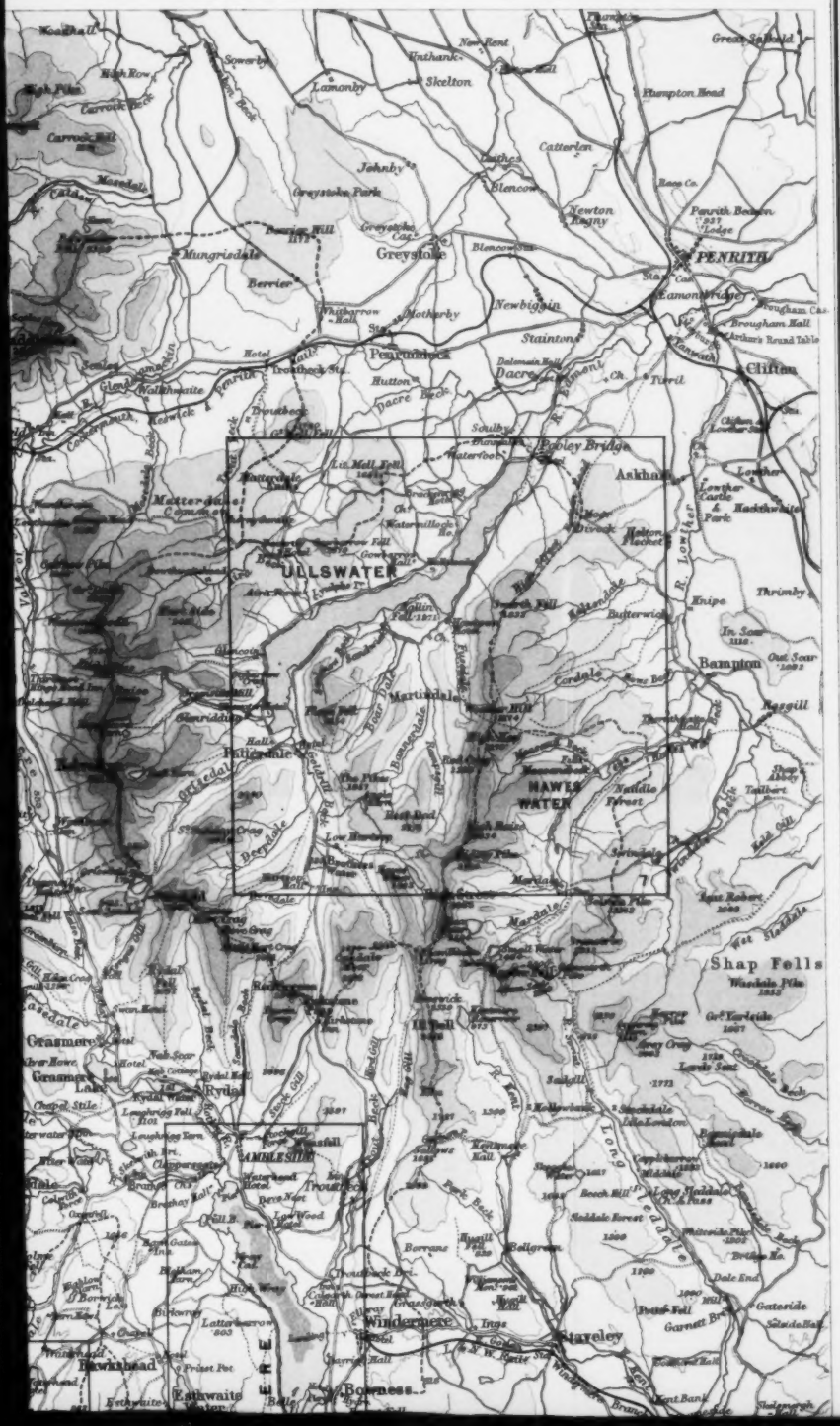
FEET	METRES
3000	914·4

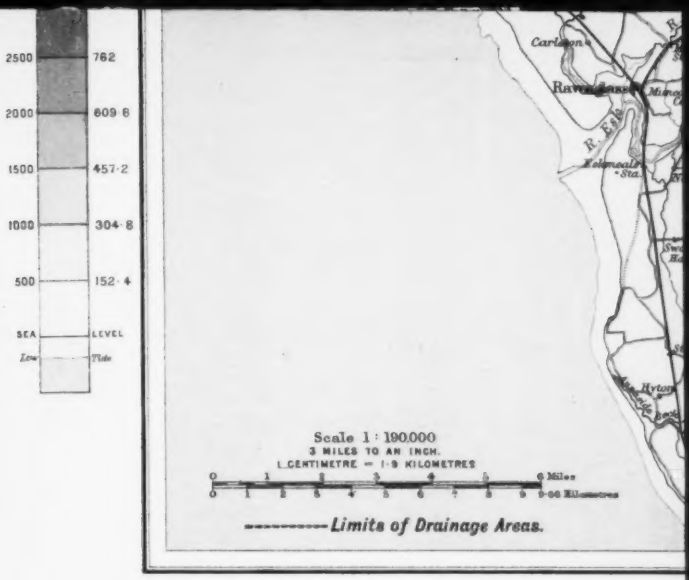
General Map of the English Lake Dist

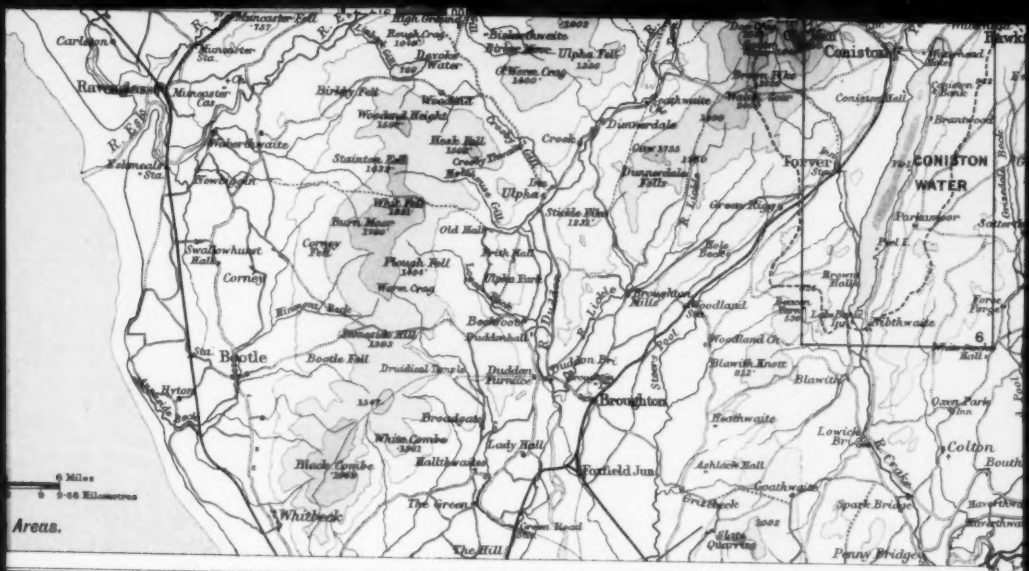
(From the Ordnance Survey)

SHOWING THE LIMITS OF THE SPECIAL MAPS.


BASSENTHWAITE LAKE
DERWENT WATER
GRUNDOCK WATER
BUTTERMERE
ENNERDALE WATER
WAST WATER
COCKERMOUTH
KESWICK
Dearham
Tallentire
Bridekirk
Dovenby
Papcastle
Brigham
Derwent
Embleton
Cockermouth
Wythop Mill
Elva Hill
Broomrigg
Whinlatter Pass
Braithwaite
Lorton
Low Lorton
Whin Fell
Mosser
Fellbarrow
Low Fell
Crummock
Buttermere
Loweswater
Lamplugh
Blaze Fell
Warnscale Fell
Gasgale Fell
Scale Force
Scarth Gap
Gillerthwaite
Ennerdale
Kirkland
Ennerdale Bridge
Kinniside Common
Caldbeck Fells
Caldbeck
Whitbeck
Wolsty
Silloth
Allonby
Maryport
Flimby
Workington
Harrington
Moresby
Whitehaven
Cleator
Cleator Moor
Frizington
Arlecdon
Rowrah
Ullock
Dean
Pardshaw
Eaglesfield
Greysouthen
Clifton
Lowside Quarter
Whinlatter
Grisedale
Newlands
Stonycroft
Rigg
Scawdel
Scawdel Castle
Dale Head
Hindscarth
Robinson
Whiteless Pike
Causey Pike
Barrow
Grisedale Pike
Hobcarton Crag
Eel Crag
Sail
Crag Hill
Wandope
Whiteless Breast
Sand Hill
Sail Pass
Braithwaite Fell
Outerside
Stile End
Scar Crags
Sail Beck
Force Crag
Force Crag Mine
Coledale Hause
Coledale
Hobcarton End
Barrow House
Barrow Door
Stonycroft Gill
Rigg Beck
Newlands Church
Newlands Hause
Keskadale
Keskadale Oak
Gatesgarth
Scope End
Scope End Hause
Littletown
Low Moss
Rannerdale Knotts
Whiteless Pike
Wandope
Grasmoor
Grasmoor End
Lad Hows
Whinlatter Pass
Braithwaite


ULLSWATER
HAWES WATER
PENRITH
Penrith Beacon
Greystoke
Greystoke Park
Mungrisdale
Berrier
Newbiggin
Stainton
Pooley Bridge
Askham
Lowther
Clifton
Brougham Hall
Brougham Cas.
Arthur's Round Table
Dacre
Dacre Beck
Pennamire
Troutbeck Sta.
Matterdale Common
Matterdale
Martindale
Patterdale
Place Fell
Helvellyn
Striding Edge
Swirral Edge
Catstycam
Raise
Stybarrow Dodd
Watson's Dodd
Hart Side
Great Dodd
Clough Head
Blencow
Catterlen
Newton Rigny
Eamont Bridge
Eamont R.
Lowther R.
Lowther Castle & Park
Hackthwaite
Thrimby
Knipe
Bampton
Bampton Grange
Measgill
Shap Fells
Wasdale Pike
Great Yarlside
Gt. Asby Scar
Lowis Scar
Tailbert
Askham Fell
Askham Moor
Moor Divock
Motion Hackett
Butterwick
Corfe Gill
Kidsty Pike
High Raise
Low Raise
Middle Fell
Rest Dodd
Red Crag
Red Screes
Kirkstone Pass
Brothers Parting
Hartsop
Hartsop above How
Dovedale
Deepdale
Fusedale
Grasmere
Grasmere Lake
Rydal
Rydal Water
Loughrigg Fell
Loughrigg Tarn
Chapel Stile
Langdale
Blea Tarn
Pike o' Blisco
Crinkle Crags
Bowfell
Esk Pike
Great End
Scafell Pike
Scafell
Broad Crag
Ill Crag
Glaramara
Allen Crags
Seathwaite Fell
Seathwaite
Sty Head
Sty Head Pass
Rossett Gill
Angle Tarn
Esk Hause
Grains Gill
Stake Pass
Langstrath
Stonethwaite
Rosthwaite
Borrowdale
Derwentwater
Keswick
Skiddaw
Skiddaw Little Man
Carrock Fell
Caldbeck
Mosedale
Sowerby
Lamonby
Skelton
Unthank
New Rent
Hampton Head
Race Co.
Whitbarrow Hall
Whitbarrow Scar
Motherby
Troutbeck
Hutton
Soulby
Waterbooth
Ullock Pike
Lonscale Fell
Lonscale Pike
Blencathra
Saddleback
Threlkeld
Wanthwaite
Glenderamackin
Walkhampton
Scales
Scales Fell
Sharp Edge
Bannerdale Crags
Bannerdale
Mell Fell
Mellbreak
Whiteside
Grasmoor
Grasmoor End
Whin Rigg
Wandope
Crag Hill
Sail
Causey Pike
Outerside
Barrow
Grisedale
Grisedale Tarn
Fairfield
Hart Crag
Dove Crag
Hartsop Dodd
Caudale Moor
Caudale Head
Deepdale Hall
Patterdale Hall
Glenridding
Glenridding Dodd
Sheffield Pike
Stybarrow Crag
Helvellyn Lower Man
Nethermost Pike
Dollywaggon Pike
Fairfield
Seat Sandal
Middle Dodd
Raise Beck
Sticks Pass
Thirlmere
Wythburn
Wythburn Fell
Armboth
Helvellyn Gully
Keppel Cove
Red Tarn
Swirral Edge
Striding Edge
Nethermost Cove
Grisedale Hause
Grisedale Pass
Tongue
Ullswater
Gowbarrow Park
Aira Force
Aira Beck
Dockray
Watermillock
Matterdale End
Troutbeck
Troutbeck Sta.
Troutbeck Tongue
Troutbeck Park
Troutbeck Bridge
Ambleside
Rydal
Rydal Mount
Rydal Hall
Nab Scar
Nab Cottage
Loughrigg Terrace
Loughrigg Fell
Fox How
Brathay
Brathay Hall
Skelwith Bridge
Skelwith Fold
Colwith Force
Elterwater
Langdale Pikes
Pike of Stickle
Harrison Stickle
Loft Crag
Gimmer Crag
Mickleden
Oxendale
Hanging Knotts
Rosset Ghyll
Great Gable
Green Gable
Base Brown
Brandreth
Grey Knotts
Honister Pass
Honister Crag
Gatesgarth
Buttermere
Buttermere Lake
Crummock Water
Crummock Lake
Low Fell
Fellbarrow
Whiteless Pike
Wandope
Eel Crag
Sail Pass
Coledale
Coledale Hause
Coledale Head
Force Crag
Force Crag Mine
Braithwaite
Braithwaite Fell
Whinlatter Pass
Whinlatter
Whinlatter Top
Barrow House
Barrow Bay
Barrow Cascade
Cat Bells
Maiden Moor
Newlands
Newlands Hause
Newlands Church
Newlands Valley
Robinson
Hindscarth
Dale Head
Dale Head Hall
Dale Head Tarn
Honister Hause
Littledale Hall
Littledale
Watendlath
Watendlath Tarn
Lodore
Lodore Falls
Lodore Hotel
Derwentwater
Derwent Isle
Lord's Island
Vicarage Island
Friar's Crag
Calfclose Bay
Portinscale
Grange
Grange Fell
Castle Crag
Manesty
Hawse End
Catbells
Skelgill
Skelgill Bank
Ullock
Ullock Pike
Bassenthwaite Lake
Bassenthwaite
Dodd
Ling Fell
Sale Fell
Wythop Mill
Wythop Hall
Lorton
Lorton Vale
Whinlatter
Whinlatter Pass
Whinlatter Top
Low Fell
Fellbarrow
Crummock Water
Buttermere
Buttermere Lake
Gatesgarth
Honister Pass
Honister Crag
Grey Knotts
Brandreth
Green Gable
Great Gable
Base Brown
Rosset Ghyll
Hanging Knotts
Oxendale
Mickleden
Loft Crag
Gimmer Crag
Harrison Stickle
Pike of Stickle
Langdale Pikes


2500
762
2000
609·6
1500
457·2
1000
304·8
500
152·4
SEA LEVEL
Low Tide
Carlingford
Ravensbourne
Mimosa
R. Esk
Ipswich
Hyton
Scale 1 : 190,000
3 MILES TO AN INCH.
1 CENTIMETRE = 1·9 KILOMETRES
0 1 2 3 4 5 6 Miles
0 1 2 3 4 5 6 7 8 9 9·66 Kilometres
Limits of Drainage Areas.



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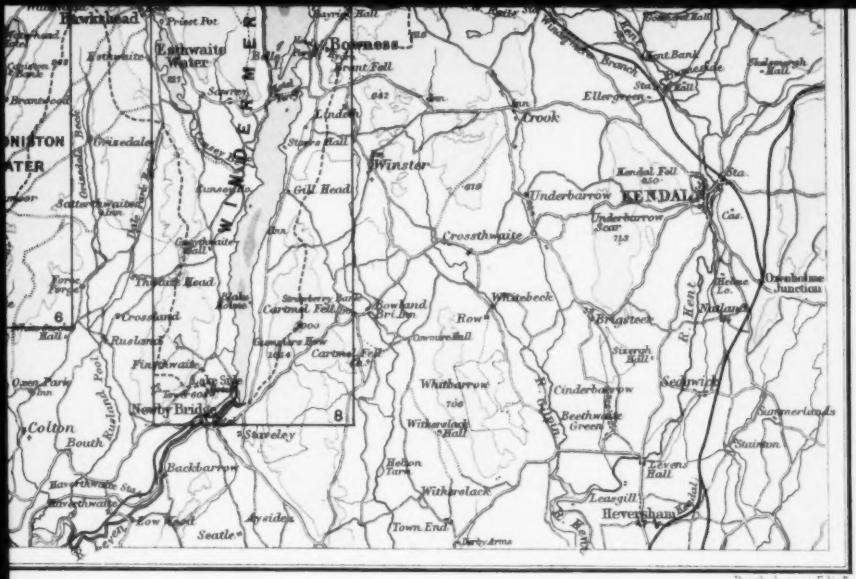
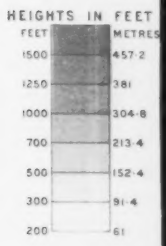
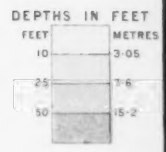
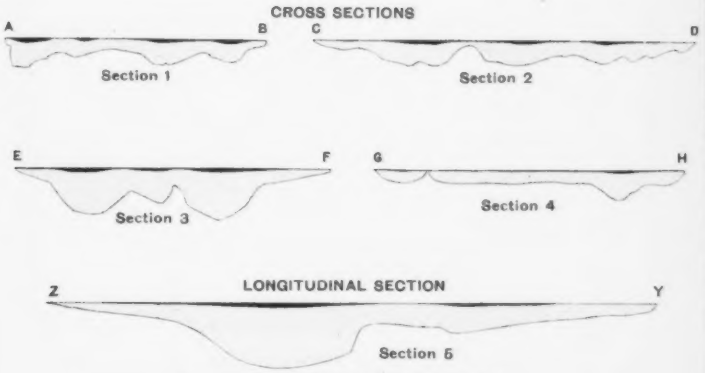


Bartholomew Edinr





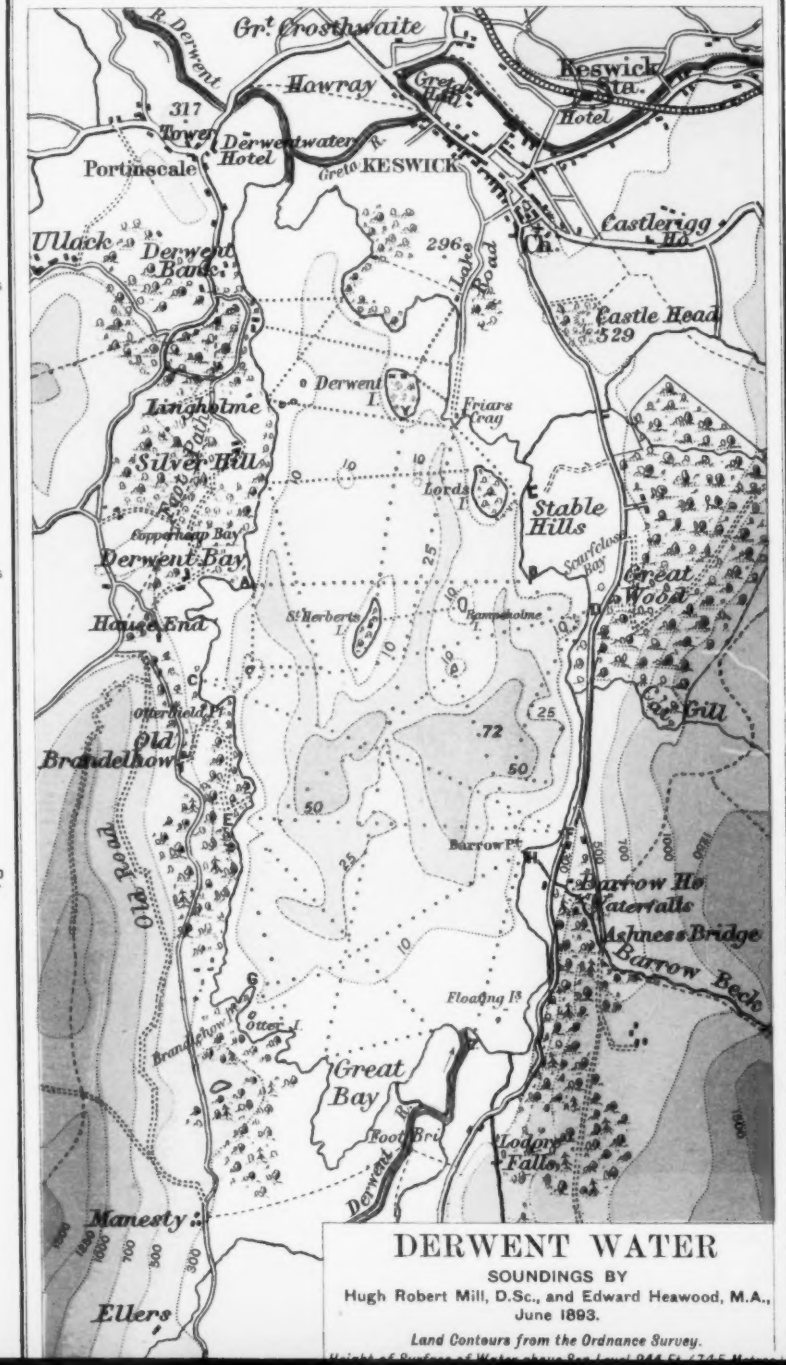


Longitudinal Section from Derwent Delta to Derwent Island (straight line).

Note to Sections

Scale of Length 2 Inches = 1 Mile, same as in Map.

The Black Part is the Section on the same Scale : the Blue Colour


Gr.t Crosthwaite
R. Derwent
Hawray
Keswick Sta.
Hotel
317
Tower
Derwentwater Hotel
Portinscale
Greta R.
KESWICK
Castlerigg Hill
Ullock
Derwent Bank
296
Lake Road
Ch.
Castle Head
529
Derwent I.
Friars Crag
Lingholme
Silver Hill
Lords I.
Stable Hills
Copperhanp Bay
Derwent Bay
Scarfclose Bay
Great Wood
Hawse End
St Herberts I.
Rampsholme
Cat Gill
Otterfield Pt
Old Brandelhow
.72
Old Road
Barrow Pt
Barrow Ho
Waterfalls
Ashness Bridge
Barrow Beck
Floating Is
Great Bay
Foot Bri
Lodore Falls
Manesty
Ellers
DERWENT WATER
SOUNDINGS BY
Hugh Robert Mill, D.Sc., and Edward Heawood, M.A.,
June 1893.
Land Contours from the Ordnance Survey.
FEET
METRES
457·2
381
304·8
213·4
152·4
91·4
61
FEET
METRES
3·05
7·6
15·2

Note to Sections

Scale of Length 2 Inches = 1 Mile, same as in Map.

The Black Part is the Section on the same Scale; the Blue Colour shows the Section with Depths exaggerated 15 times.

Hugh Robert Mill, D.Sc., and Edward Heawood, M.A.,
June 1893.

Land Contours from the Ordnance Survey.
Height of Surface of Water above Sea Level 244 Ft. (74·5 Metres).

Scale 1 : 31,680 Bartholomew Edin^r

2 INCHES TO 1 MILE
1 CENTIMETRE — 0·31 KILOMETRE

0 1 Mile
0 1 1·61 Kilometres

Published by the Royal Geographical Society.

MAP III

HEIGHTS IN FEET

FEET	METRES
1500	457·2
1250	381
1000	304·8
700	213·4
500	152·4
300	91·4
200	61

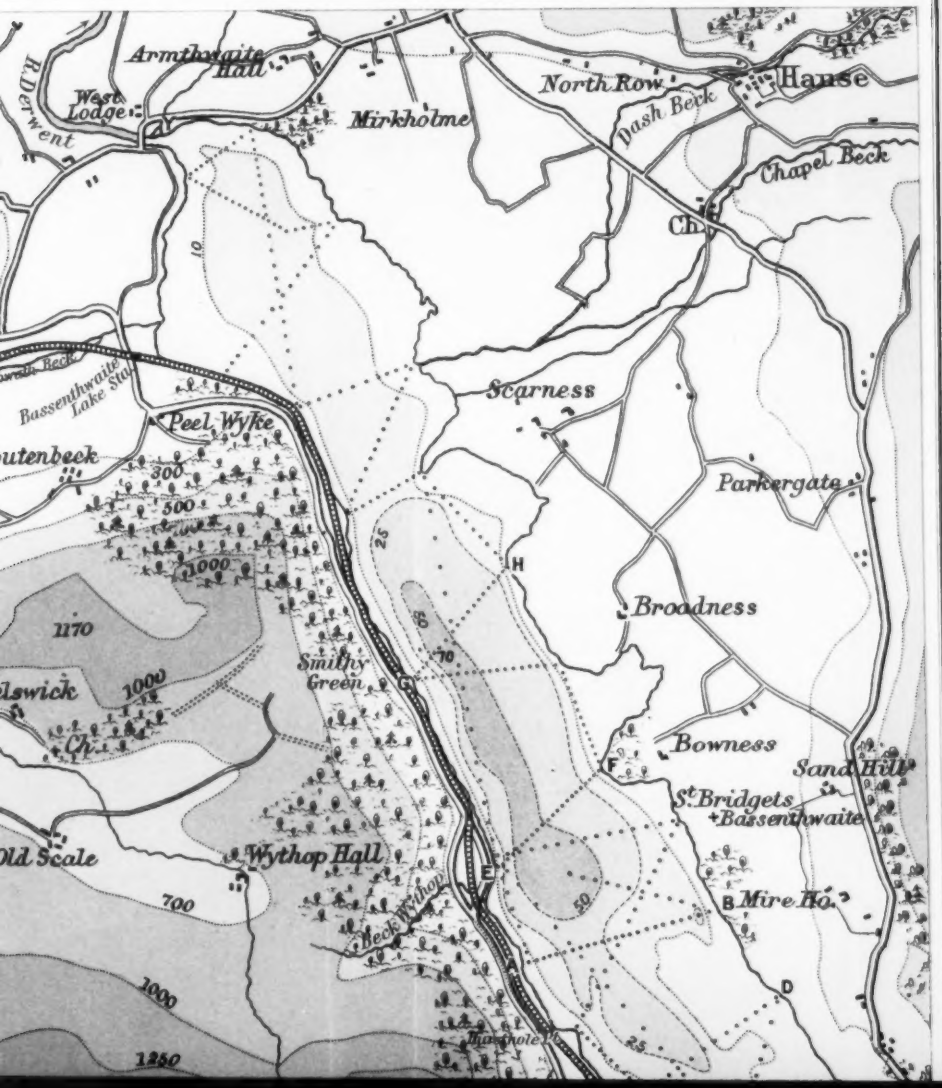
DEPTHS IN FEET

FEET	METRES
10	3·05
25	7·6
50	15·2

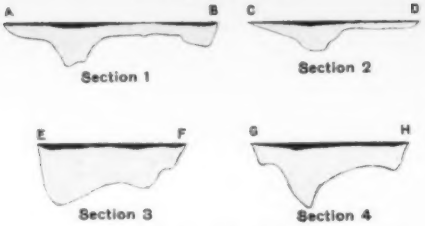
LONGITUDINAL SECTION

Longitudinal Section, along axis of maximum depth.

CROSS SECTIONS


Armthwaite Hall
West Lodge
R. Derwent
Mirkholme
North Row
Hause
Dash Beck
Chapel Beck
Ch.
Bassenthwaite Lake Sta.
Peel Wyke
Scarness
Parkergate
Broadness
Smithy Green
Bowness
Sand Hill
St. Bridgets
Bassenthwaite
Wythop Hall
Beck Wythop
Mire Ho.
Old Scale
Ch.
300
500
1000
1170
700
1250
10
25
50
70
H
F
E
D
B

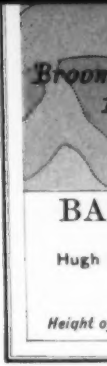
CROSS SECTIONS

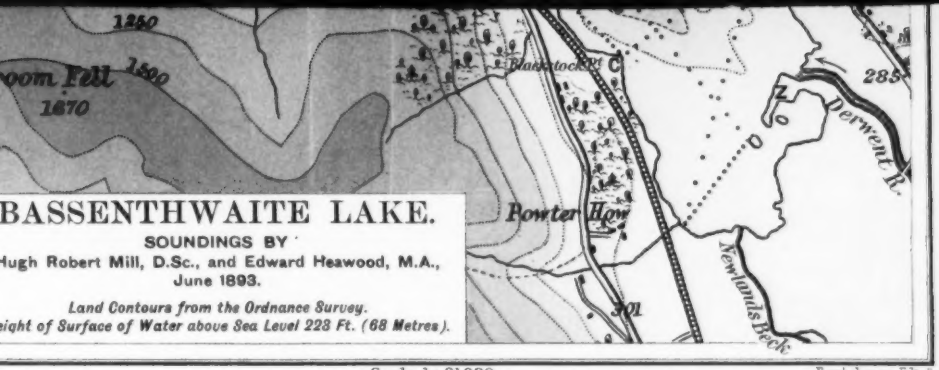


Note to Sections

Scale of Length 2 Inches = 1 Mile, same as in Map.

The Black Part is the Section on the same Scale; the Blue Colour shows the Section with Depths exaggerated 15 times.





BASSENTHWAITE LAKE.

SOUNDINGS BY

Hugh Robert Mill, D.Sc., and Edward Heawood, M.A.,
June 1893.

Land Contours from the Ordnance Survey.
Height of Surface of Water above Sea Level 223 Ft. (68 Metres).

Scale 1 : 31,680

2 INCHES TO 1 MILE

1 CENTIMETRE = 0·31 KILOMETRE

0 1 Mile

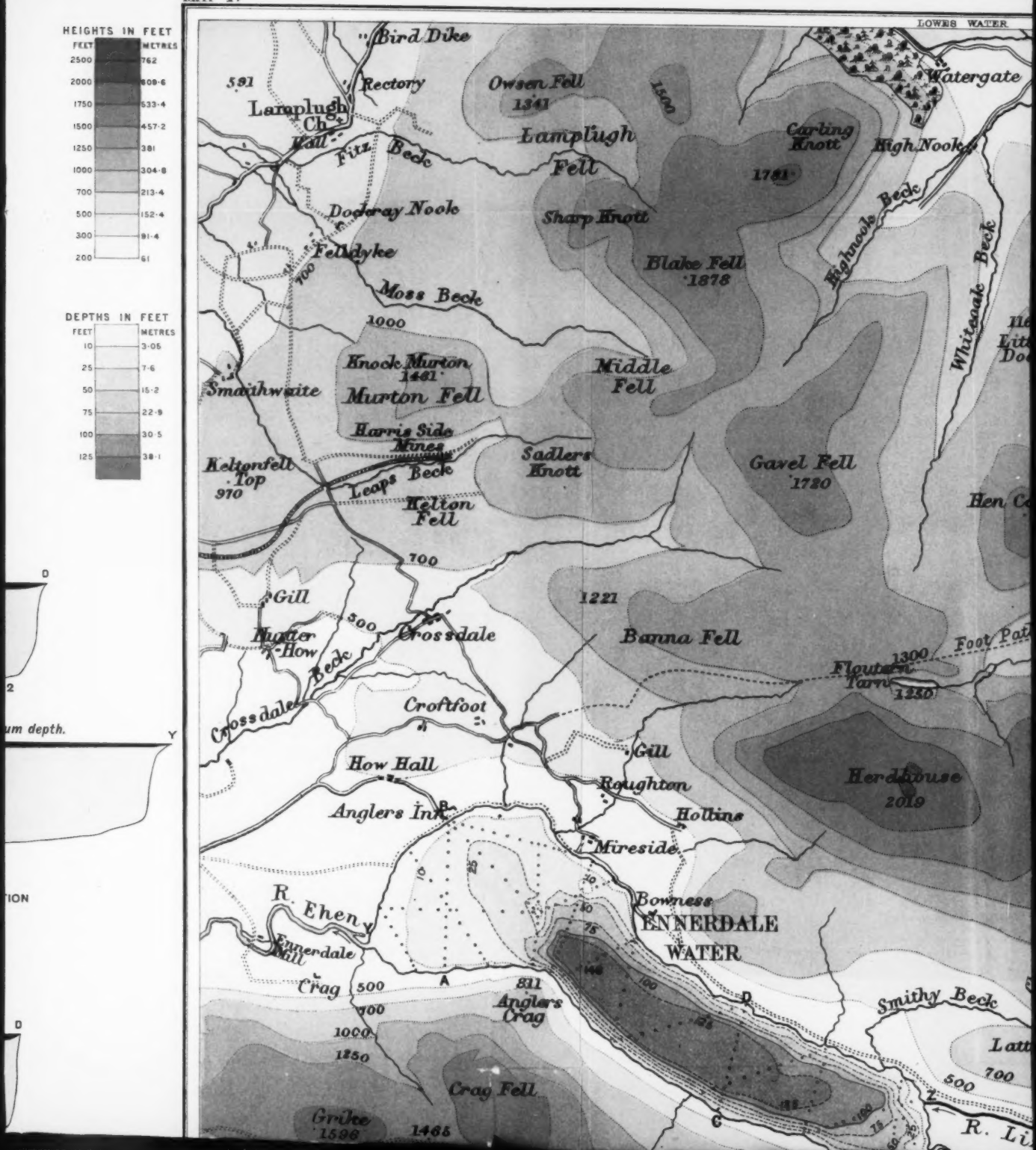
0 1 1·61 Kilometres

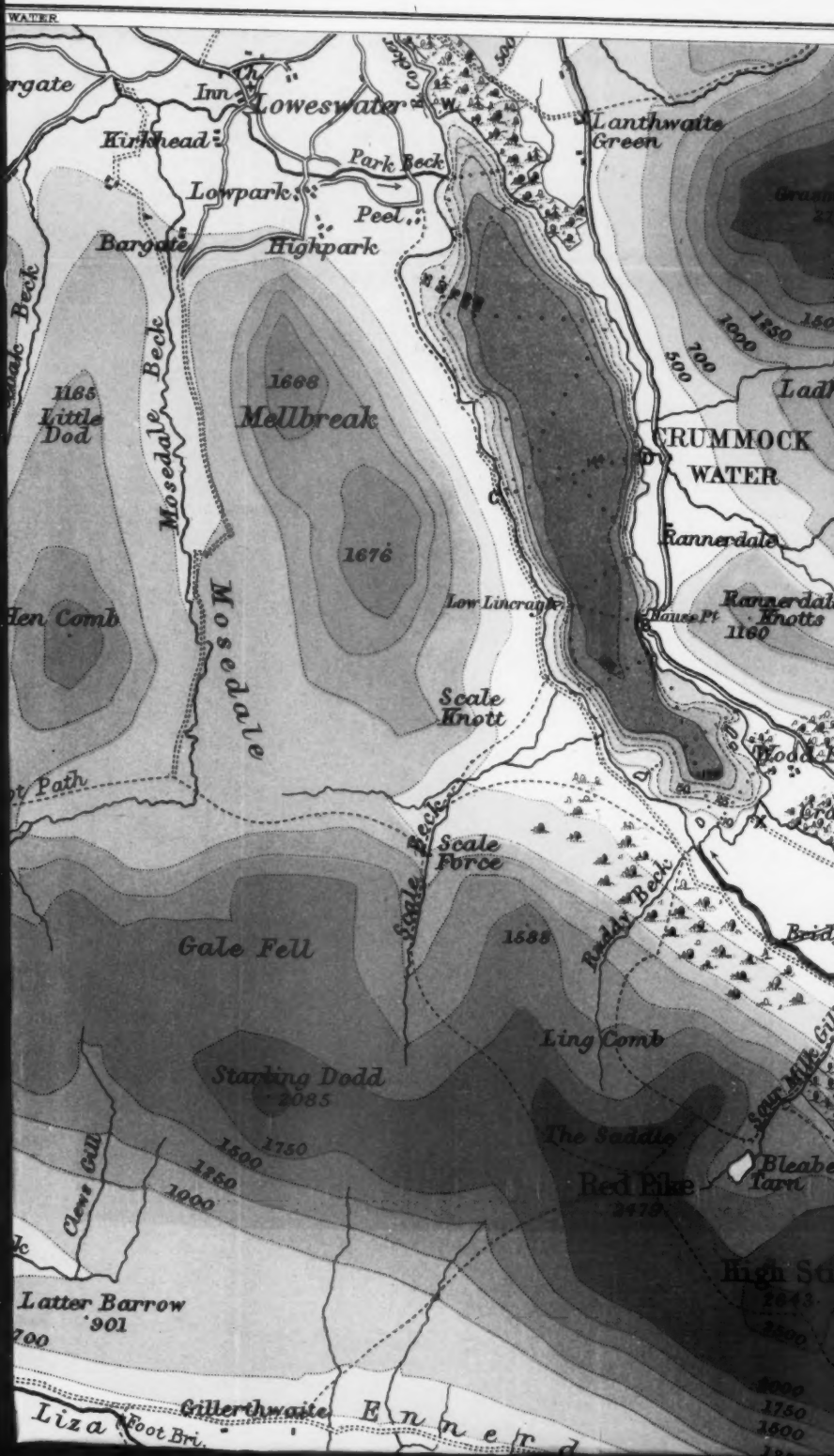
Bartholomew Edin^r

Published by the Royal Geographical Society.

W
CRUMMOCK.
Longitudinal Section, along axis of maximum depth.
ENNERDALE CROSS SECTIONS
A
B
C
D
Section 1
Section 2
X
ENNERDALE.
LONGITUDINAL SECTION along axis of maximum depth
Z
Section 3
Y
BUTTERMERE.
al Section, along axis of maximum depth.
BUTTERMERE. CROSS SECTION
CRUMMOCK. CROSS SECTIONS

MAP IV

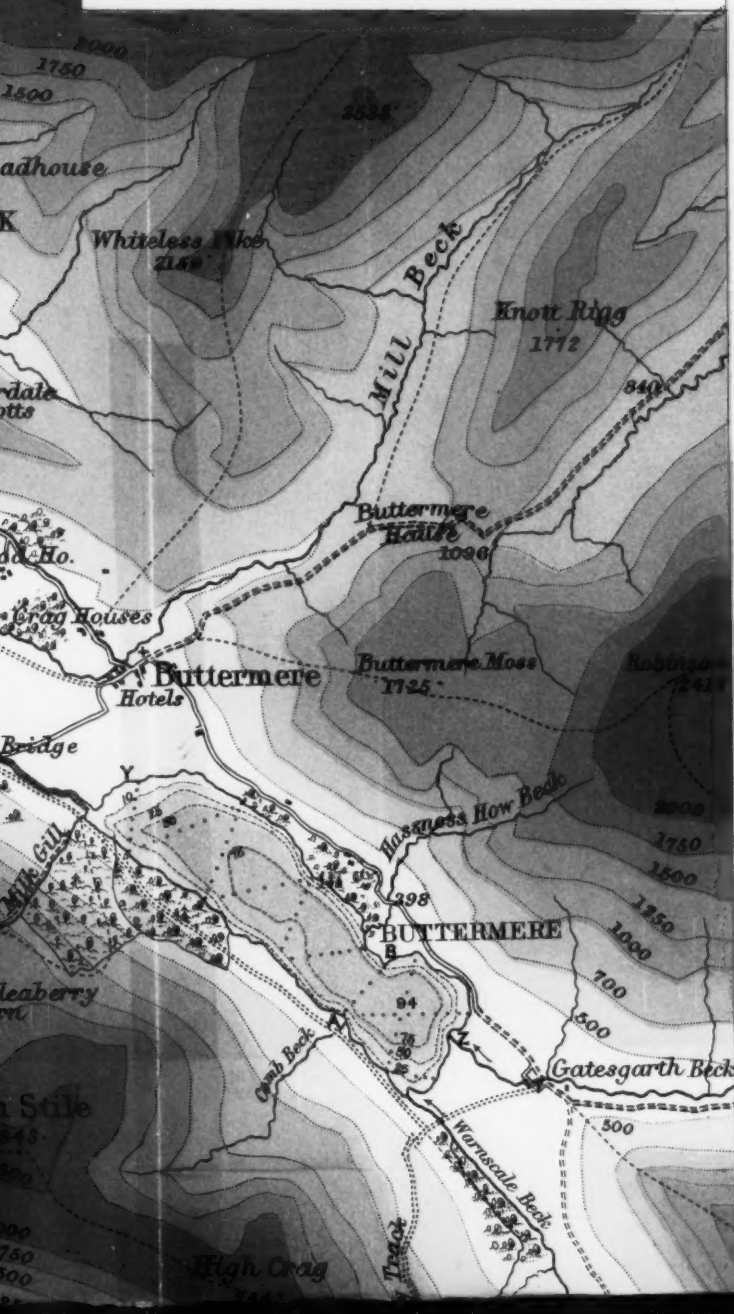

HEIGHTS IN FEET
FEET
METRES
2500
762
2000
609·6
1750
533·4
1500
457·2
1250
381
1000
304·8
700
213·4
500
152·4
300
91·4
200
61
DEPTHS IN FEET
FEET
METRES
10
3·05
25
7·6
50
15·2
75
22·9
100
30·5
125
38·1
LOWES WATER
Bird Dike
Rectory
Owsen Fell
1341
Lamplugh Ch.
Wall
Fitz Beck
Lamplugh Fell
Watergate
Carling Knott
High Nook
1781
Doddray Nook
Sharp Knott
Highnook Beck
Whitoak Beck
Felldyke
Blake Fell
1878
Moss Beck
Knock Murton
1461
Middle Fell
Smaithwaite
Murton Fell
Harris Side Mines
Keltonfell Top
970
Leaps Beck
Sadlers Knott
Gavel Fell
1720
Kelton Fell
Gill
Hutter How
Crossdale Beck
Crossdale
1221
Banna Fell
Foot Path
Floutern Tarn
1250
Croftfoot
How Hall
Gill
Roughton
Herdhouse
2019
Anglers Inn
Hollins
Mireside
R. Ehen
Bowness
ENNERDALE WATER
Ennerdale Hall
Crag
Anglers Crag
811
Smithy Beck
Crag Fell
Grike
1598
1465
R. Li

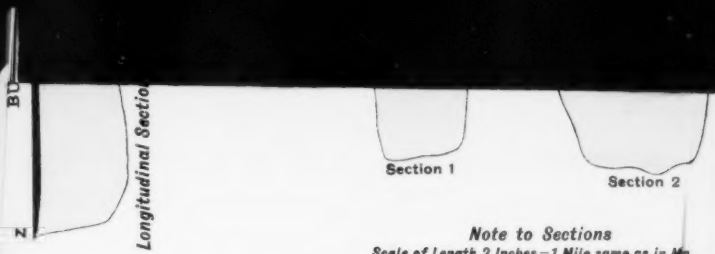

WATER
Inn
Loweswater
Kirkhead
Park Beck
Lowpark
Peel
Highpark
Bargate
Lanthwaite Green
Mosedale Beck
1668
Mellbreak
1185
Little Dod
1676
Mosedale
Low Lincraft
CRUMMOCK WATER
Rannerdale
Rannerdale Knotts
1160
Scale Knott
Scale Force
Scale Beck
Gale Fell
1585
Ling Comb
Starling Dodd
2085
The Saddle
Red Pike
2478
Bleabe Tarn
Sour Milk Gill
Latter Barrow
901
Clews Gill
Gillerthwaite
Foot Bri.
Liza
Ennerd
1750
1600
1850
1000
700
500

BUTTERMERE, CRUMMOCK WATER, AND ENNERDALE WATER.

SOUNDINGS BY
Edward Heawood, M.A., and R. Shields.,
October 1893.

Land Contours from the Ordnance Survey.
Height of Surface of Water above Sea Level—Buttermere 329 Ft. (100 Metres), Crummock Water 321 Ft. (98 Metres), Ennerdale Water 368 Ft. (112 Metres).





Note to Sections

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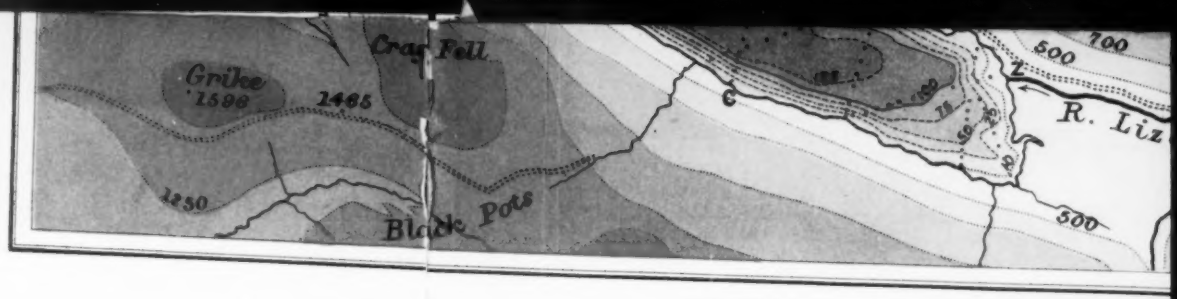

Crag Fell
Grike
1598
1465
1250
Black Pots
500
700
R. Liz
500

Scale 1 : 31,680

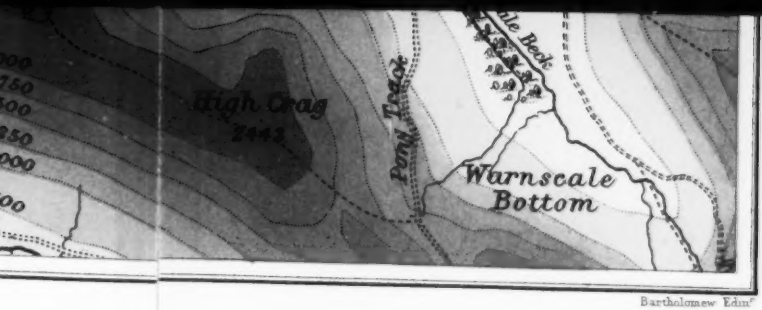
2 INCHES TO 1 MILE

1 CENTIMETRE = 0·31 KILOMETRE

0 1 Mile

0 1·61 Kilometres

Published by the Royal Geographical Society.



Bartholomew Edin^{r}